SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF SAN DIEGO

Coordination Proceeding Special Title (Rule 1550 (b))	JCCP No. 4042
In re TOBACCO CASES II	DEPOSITION OF
This document relates to:	WILLIAM W. NAZAROFF, PH.D.
The People of the State of California, et al. v. Philip Morris, Incorporated, et al., Los Angeles Superior Court Case No. BC 194217;	VOLUME III
	PAGES 422 - 635
The People of the State of California, et al. v General Cigar Co., et al., San Francisco Superior Court Case No. 996780;	
The People of the State of California, et al. v. Brown & Williamson, et al., San Francisco Superior Court Case No. 996781;	
The People of the State of California, et al. v. Tobacco Exporters, et al., San Francisco Superior Court Case No. 301631	

TAKEN ON: Monday, July 10, 2000

TAKEN AT: 550 West C Street, Suite 1440
San Diego, California 92101

REPORTED BY: Margaret A. Smith
CSR No. 9733

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I N D E X

WITNESS	EXAMINED BY	PAGE
William Nazaroff, Ph.D.	(Mr. Kodsi)	425
	(Mr. Cafferty)	502

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09:08:01 12 560 Letter to William Nazaroff, Ph.D.
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09:08:01 1 San Diego, California; Monday, July 10, 2000; 9:15 a.m.
09:08:01 2
09:08:01 3 VIDEOGRAPHER: Good morning. We are on the
09:14:57 4 record. This is the videotaped deposition of Dr. William
09:15:00 5 Nazaroff. It's Volume III. It's taken in the matter of
09:15:06 6 the People of the State of California and the City of
09:15:07 7 San Jose in re Tobacco Cases II. It's in Superior Court,
09:15:13 8 State of California, County of San Diego, Case JCCP 4042.
09:15:21 9 It's being held at Vail, Christians and
09:15:23 10 Associates, 550 West C Street, Suite 1440 in San Diego.
09:15:29 11 Today's date is Monday, July 10th, 2000, and
09:15:33 12 the time is 9:15 a.m. My name is Christian Teare. I'm
09:15:39 13 from the firm of AJL Video Taping Services, 1919 Grand
09:15:44 14 Avenue, Suite 2C, in San Diego.
09:15:46 15 The certified shorthand reporter is Maggie
09:15:49 16 Smith with Vail, Christians and Associates.
09:15:52 17 Video and audio recording will be taking
09:15:57 18 place at all times during this deposition unless counsel
09:16:00 19 have specifically requested to go off the record.
09:16:01 20 And if counsel would please state their
09:16:04 21 appearances, the reporter will then swear in the witness.
09:16:07 22 MR. KODSI: Neil Kodsi on behalf of the R.J.
09:16:09 23 Reynolds Tobacco Company.
09:16:11 24 MR. LENDRUM: Jeff Lendrum on behalf of
09:16:14 25 Liggett Group.
09:16:15 26 MR. HOLTMANN: John Holtmann for Philip
09:16:17 27 Morris.
09:16:19 28 MR. McGUIRE: Mick McGuire for the American

09:16:22 1 Environmental and Safety Institute.

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09:16:24 2
09:16:24 3 WILLIAM NAZAROFF, Ph.D.,
09:16:24 4 BEING FIRST DULY SWORN, TESTIFIED AS FOLLOWS:
09:16:24 5
09:16:24 6 EXAMINATION
09:16:24 7 BY MR. KODSI:
09:16:35 8 Q Good morning, Dr. Nazaroff.
09:16:37 9 A Good morning.
09:16:39 10 Q I'll introduce myself for the record. I'm
09:16:42 11 Neil Kodsi. I'm going to be asking you some questions in
09:16:44 12 this case.
09:16:44 13 You were deposed in this case in August
09:16:47 14 of 1999, I believe, correct?
09:16:49 15 A I was deposed. I don't remember the
09:16:50 16 date. But that sounds right.
09:16:51 17 Q And you may or may not know this. This
09:16:53 18 deposition was related to a particular motion filed by the
09:16:57 19 plaintiffs, and it was related to an affidavit or
09:16:59 20 declaration that you filed. And although I may cover some
09:17:02 21 of that ground again, I'm going to try to focus really
09:17:05 22 today on the testimony that you plan to offer in the trial
09:17:07 23 of this case, just so you understand kind of the
09:17:10 24 groundwork.
09:17:11 25 Now, have you had your deposition taken since
09:17:15 26 August of 1999?
09:17:17 27 A No.
09:17:19 28 Q I know you've had a few, but just so you

09:17:23 1 know, I want you to try to answer the questions without
09:17:26 2 having to speculate.
09:17:27 3 And if you need a break at any time, feel
09:17:30 4 free to let me know, and we'll take a break.
09:17:34 5 And if you don't understand a question that I
09:17:36 6 ask, which might happen quite often, let me know, and
09:17:39 7 we'll try to rephrase that for you and try to make sure
09:17:42 8 that you're understanding the questions.
09:17:43 9 If you do answer a question, I'm going to
09:17:45 10 assume that you understood what I was asking.
09:17:46 11 Now, a couple times already, I've referred to
09:17:50 12 this case, and when I say that, I mean the long caption
09:17:53 13 that the videographer just read, of the People of
09:17:56 14 California versus several defendants here.
09:17:58 15 What is your understanding of what this case
09:18:01 16 is about?
09:18:03 17 MR. McGUIRE: No foundation.
09:18:04 18 You can answer.
09:18:11 19 THE WITNESS: The case concerns exposure of
09:18:13 20 nonsmokers to environmental tobacco smoke, and as far as
09:18:20 21 my understanding goes, whether the fact of that exposure
09:18:27 22 and the risk caused by it constitutes or gives rise to
09:18:33 23 unfair business practice on the part of the tobacco
09:18:36 24 companies.
09:18:37 25 BY MR. KODSI:
09:18:37 26 Q Do you have an understanding of what the
09:18:44 27 unfair business practices are that have been alleged?
09:18:50 28 A No, I really don't.

09:18:52 1 Q Do you know who the parties are that are
09:18:58 2 involved in this lawsuit?
09:19:01 3 A Not specifically, no.
09:19:04 4 Q Do you have an understanding as to who you
09:19:07 5 were testifying on behalf of?
09:19:09 6 A It's an organization called AESI, I believe.

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09:19:14 7 Q Do you have an understanding of what AESI is?
09:19:17 8 A Only that it's a nonprofit public interest
09:19:26 9 group.
09:19:27 10 Q Do you know what AESI stands for?
09:19:31 11 A I think it's American Environmental Safety
09:19:36 12 Institute, or something close to that.
09:19:40 13 Q Okay. Do you have an understanding as to
09:19:42 14 what AESI is seeking in this lawsuit?
09:19:45 15 A Not in detail, no.
09:19:49 16 Q Well, how about do you have any understanding
09:19:51 17 whatsoever?
09:19:52 18 A I think that they are seeking a -- some kind
09:19:58 19 of public information campaign to be funded by the
09:20:01 20 industry, and I suspect that they're also seeking funding
09:20:06 21 for that and maybe funding to support the case itself.
09:20:11 22 Q Okay. Now, with respect to AESI, have you
09:20:21 23 ever -- other than the attorneys that you might have met,
09:20:23 24 have you met anyone affiliated with AESI?
09:20:26 25 A No.
09:20:27 26 Q All right. Do you understand what the
09:20:28 27 purpose of AESI is?
09:20:30 28 A No more than their involvement in this case,

09:20:37 1 no.
09:20:37 2 Q So you're not familiar with any mission
09:20:39 3 statements or official statements of purpose for that
09:20:42 4 organization?
09:20:42 5 A That's correct.
09:20:43 6 Q Okay. Did you bring any documents with you
09:20:46 7 today?
09:20:46 8 A I have my briefcase which has a few documents
09:20:54 9 in it.
09:20:57 10 Q To your knowledge, are there any documents in
09:20:59 11 your briefcase that you haven't already provided to us?
09:21:02 12 A No, I don't believe so.
09:21:03 13 Q Okay. Okay. Have you been involved in any
09:21:18 14 other litigation as an expert witness since you were last
09:21:22 15 deposed in August of 1999?
09:21:23 16 A No.
09:21:24 17 Q All right. I think you did say you haven't
09:21:27 18 been deposed since then?
09:21:28 19 A That's correct.
09:21:29 20 Q And you haven't been identified as a
09:21:32 21 testifying expert in any litigation since then?
09:21:33 22 A That's also correct.
09:21:34 23 Q Okay. Now, have you done any work related to
09:22:00 24 this case since your August 1999 deposition?
09:22:03 25 A Yes, I have.
09:22:03 26 Q Okay. Could you describe maybe generally for
09:22:07 27 me what you've done since August '99?
09:22:11 28 A It was not long after that, that I did some

09:22:17 1 work to assist Brian Brookey, an attorney for Preston,
09:22:24 2 Gates & Ellis, in taking depositions of Kelman and LeVois,
09:22:33 3 I believe.
09:22:34 4 Q Okay.
09:22:34 5 A To the best of my recollection, that was all
09:22:39 6 that I did until a few months ago when I was contacted
09:22:49 7 both by Mr. Maguire's associate, Karen Frostrom, and also
09:22:57 8 by Brian Brookey or one of the associates from Preston,
09:23:01 9 Gates & Ellis, explaining to me that the Prop 65 part of
09:23:10 10 this case was no longer -- or the claims have been
09:23:12 11 rejected, as I understand, by the judge, and that

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09:23:19 12 Mr. Maguire's firm would be the new lead attorney to
09:23:23 13 pursue a remaining claim related to the unfair business
09:23:28 14 practice issue.
09:23:29 15 And so I had some conversations with
09:23:36 16 Mr. Maguire's -- with Mr. McGuire and with people in his
09:23:40 17 firm. And I was asked to extend my analyses to consider
09:23:53 18 individuals who are not just receiving average levels of
09:23:57 19 exposure, but those who may be receiving higher than
09:23:59 20 average levels of exposure. And so I did some additional
09:24:04 21 analyses on that issue.
09:24:14 22 Q Okay. Let me start first by going back to
09:24:18 23 the work you did for Brian Brookey in assisting him in
09:24:23 24 preparing for depositions.
09:24:25 25 What exactly did you do there?
09:24:26 26 A I was provided declarations by Kelman and by
09:24:39 27 LeVois. And I was asked to prepare a critique, if you
09:24:44 28 will, of those declarations. So I read them, and I read

09:24:50 1 some associated references, I believe. And on the basis
09:24:58 2 of my reading and consideration and based on my knowledge
09:25:04 3 of the issues involved, I prepared some comments or
09:25:11 4 suggestions that I passed on to Mr. Brookey, to assist him
09:25:21 5 in the questions he was asking at deposition.
09:25:23 6 Q Okay. How did you go about preparing your
09:25:35 7 critique? What did you review, other than the
09:25:37 8 declarations?
09:25:38 9 A I don't recall anything specific that I
09:25:46 10 reviewed, other than the declarations.
09:25:48 11 Q And is there anything else up until two
09:25:56 12 months ago that you did for this case?
09:26:01 13 A I don't recall anything else.
09:26:03 14 Q Okay. How much time have you spent working
09:26:08 15 on this case since last August?
09:26:16 16 A I don't recall precisely. Approximately,
09:26:22 17 maybe 40 hours.
09:26:23 18 Q And does that 40 hours include the critiques
09:26:27 19 of the Kelman and LeVois declarations?
09:26:30 20 A If it did, it's probably a little low as an
09:26:33 21 estimate. It may be more like 60 hours.
09:26:35 22 Q Okay. Have you met with any of the other
09:26:53 23 experts involved in this case?
09:26:54 24 A Since August?
09:26:55 25 Q Yeah. I'm sorry. Good clarification. Since
09:26:58 26 August of 1999.
09:26:59 27 A No, I have not.
09:27:01 28 Q What about attorneys involved in this case?

09:27:12 1 A I've met with Mr. McGuire.
09:27:17 2 Q Anyone else since August '99?
09:27:22 3 A Are you only referring to a physical meeting,
09:27:25 4 or telephone conversations too?
09:27:28 5 Q Let's -- let's include all of them for right
09:27:30 6 now. Both meetings and telephone conversations.
09:27:32 7 A I believe I had a telephone conversation with
09:27:37 8 Brian Brookey, but only at the time that I was informed
09:27:43 9 that Mr. McGuire's firm would be the lead firm as this
09:27:50 10 case went forward.
09:27:50 11 Q When did you first speak with Mr. McGuire
09:27:55 12 either by telephone or in person?
09:27:56 13 A I don't recall except that it was earlier
09:28:04 14 this year. It was after the first of the year, and it was
09:28:06 15 probably a few months ago.
09:28:08 16 Q Do you recall what that conversation was

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09:28:10 17 about?
09:28:13 18 A The gist of it was to provide me with an
09:28:21 19 update of where the case stood and to explore my continued
09:28:28 20 involvement in it as an expert.
09:28:30 21 Q And have you met -- do you -- was that a
09:28:36 22 telephone conversation, or in person?
09:28:37 23 A That was a telephone conversation.
09:28:39 24 Q When did you first meet with Mr. McGuire in
09:28:41 25 person?
09:28:41 26 A Yesterday.
09:28:42 27 Q Okay. And for how long was that?
09:28:45 28 A Two hours.

09:28:46 1 Q What did you all discuss there?
09:28:48 2 A Issues that were in the -- not issues, but
09:28:55 3 information that was conveyed in the file that I provided
09:29:00 4 in the last week or so.
09:29:01 5 Q Okay.
09:29:03 6 A And he provided me with some thoughts about
09:29:11 7 what I could expect for today.
09:29:14 8 Q Do you recall what those were?
09:29:20 9 A Not specifically, no.
09:29:21 10 Q How about generally?
09:29:22 11 A Well, I say not in a way that's easy to
09:29:34 12 capture in a brief answer. You know, some of what he told
09:29:46 13 me was advice that I had heard from Mr. Brookey before,
09:29:50 14 which I think is general advice -- I suspected is general
09:29:53 15 advice that attorneys give to experts before depositions.
09:30:05 16 Be honest. Be accurate. Don't volunteer information if
09:30:09 17 it's not asked for.
09:30:10 18 Q Anything else that comes to mind?
09:30:14 19 A Nothing that comes clearly to mind, no.
09:30:18 20 Q Have you had anyone affiliated with you at
09:30:22 21 the university where you work, help you on this case since
09:30:25 22 August 1999?
09:30:26 23 A No.
09:30:27 24 Q Okay. Have you discussed this case with any
09:30:31 25 of your colleagues?
09:30:34 26 A Again, since August?
09:30:35 27 Q Since August of 1999.
09:30:37 28 A No, I have not.

09:30:38 1 Q Okay. Now, other than meeting with
09:30:50 2 Mr. McGuire for two hours yesterday, is that the only time
09:30:53 3 you've met with him?
09:30:55 4 A We met again this morning.
09:30:57 5 Q For how long?
09:30:58 6 A 45 minutes.
09:31:00 7 Q Did you discuss anything different from what
09:31:03 8 you discussed yesterday?
09:31:04 9 A No. It was continuing the discussion that we
09:31:07 10 had yesterday.
09:31:08 11 Q Okay.
09:31:14 12 A Okay.
09:31:14 13 Q Obviously, I'm going to want to talk about
09:31:17 14 your opinions and the work you've done. But before doing
09:31:19 15 that, I think it might be helpful to get some fundamental
09:31:23 16 definitions to see if we're on the same page.
09:31:27 17 How do you -- Dr. Nazaroff, how do you define
09:31:34 18 environmental tobacco smoke?
09:31:36 19 A Environmental tobacco smoke is the mixture of
09:31:43 20 gases and particles present in air that originated from
09:31:51 21 the smoking of tobacco products.

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09:31:58 22 Q Is environmental tobacco smoke different from
09:32:02 23 side stream tobacco smoke?
09:32:04 24 A Yes.
09:32:04 25 Q In what ways?
09:32:06 26 A Side stream smoke is a term that's generally
09:32:12 27 used to refer to the gases and particles as they issue
09:32:15 28 from the smoldering tip of a cigarette or a cigar.

09:32:20 1 Environmental tobacco smoke is what one finds
09:32:26 2 in air within buildings or in general, even outdoors,
09:32:33 3 contributed because smoking occurs.
09:32:35 4 So side stream smoke is a contributor to
09:32:39 5 environmental tobacco smoke, but it's not the sole
09:32:42 6 contributor. And dilution, among other factors, could
09:32:52 7 certainly change, as a concentration of species, from
09:32:57 8 their levels inside stream smoke to the levels in
09:33:00 9 environmental tobacco smoke.
09:33:01 10 Q Now, do you have an understanding of how side
09:33:04 11 stream smoke is measured?
09:33:06 12 A I know how experiments have been conducted to
09:33:11 13 measure side stream emissions, sure.
09:33:13 14 Q Okay. Could you describe that for me.
09:33:15 15 A Generally, the approach involves trying to --
09:33:24 16 well, to burn a cigarette, often under specifically
09:33:27 17 controlled conditions where a puff is taken every 30
09:33:32 18 seconds or 60 seconds, to more or less replicate the way
09:33:36 19 that a smoker smokes a cigarette. And the cigarette --
09:33:40 20 excuse me -- itself, is placed in a sampling device that
09:33:48 21 allows all of the gases and particles that are emitted
09:33:51 22 from the cigarettes smoldering in, to be captured. And
09:33:56 23 then those captured particles and gases are subsequently
09:34:00 24 analyzed chemically to determine -- to quantify the
09:34:03 25 amounts that were emitted.
09:34:04 26 Q Now, you said the cigarette itself is placed
09:34:08 27 in a sampling device when measuring side stream smoke.
09:34:12 28 Do you have an understanding of what size

09:34:14 1 that sampling device is?
09:34:15 2 A Well, the way you've indicated with your
09:34:20 3 hands is something that would fit on a bench top is --
09:34:24 4 Q Would it be -- the glass I'm holding here,
09:34:27 5 would it be about this size?
09:34:30 6 A I've never seen such a device. So I don't
09:34:33 7 know whether it's that size or a little bit larger than
09:34:36 8 that.
09:34:36 9 MR. McGUIRE: Would you describe that size.
09:34:37 10 MR. KODSI: Yeah. We'll let you hold it so
09:34:41 11 the video record will show what I was talking about. We
09:34:43 12 were talking about a glass. And I'm terrible with
09:34:46 13 measurements.
09:34:47 14 BY MR. KODSI:
09:34:47 15 Q What is that? About five inches tall?
09:34:50 16 A Half a liter.
09:34:51 17 Q Half a liter. There you go. That's better.
09:34:53 18 MR. McGUIRE: Hi, Pat.
09:34:55 19 BY MR. KODSI:
09:34:55 20 Q Actually, you also talked about not only the
09:35:01 21 size of the sampling device, but that in measuring side
09:35:04 22 stream smoke, the attempt is to capture all of the smoke?
09:35:08 23 A That's correct.
09:35:09 24 Q So when side stream smoke measurements are
09:35:14 25 reported in the literature, that is all the side stream
09:35:16 26 smoke available for that given cigarette?

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09:35:19 27 A That's the intent.
09:35:20 28 Q Now, how is -- well, let me ask this question

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09:35:28 1 first: Is environmental tobacco smoke -- and if I say
09:35:32 2 ETS, you'll know what I mean, that it's environmental
09:35:35 3 tobacco smoke?
09:35:35 4 A Yes.
09:35:35 5 Q How -- is ETS different from mainstream
09:35:39 6 tobacco smoke?
09:35:40 7 MR. McGUIRE: Vague.
09:35:42 8 THE WITNESS: Yes, it's different.
09:35:43 9 BY MR. KODSI:
09:35:43 10 Q Could you describe for me how.
09:35:45 11 A Mainstream smoke is -- are the gases and
09:35:56 12 particles that pass through the tobacco column and the
09:35:58 13 filter, if it's present, while the smoker is puffing on
09:36:03 14 the tobacco product.
09:36:04 15 And environmental tobacco smoke, which I
09:36:08 16 recall that's what you asked?
09:36:09 17 Q Yes.
09:36:09 18 A The difference between environmental tobacco
09:36:11 19 smoke. It includes contributions both from the side
09:36:14 20 stream smoke and also from the exhaled mainstream smoke.
09:36:18 21 The smoker's lungs act as a partial filter to remove some
09:36:22 22 of what's in the mainstream smoke. So exhaled mainstream
09:36:25 23 smoke is different than inhaled mainstream smoke. And
09:36:28 24 there's the additional contribution of the side stream
09:36:30 25 smoke.
09:36:31 26 Q Do you have an opinion as to who the leading
09:36:37 27 researchers are with respect to tobacco smoke chemistry?
09:36:41 28 MR. McGUIRE: Vague as to leading.

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09:36:44 1 In what regard?
09:36:45 2 THE WITNESS: No, I do not.
09:36:47 3 BY MR. KODSI:
09:36:47 4 Q Do you have any texts that you believe are
09:36:56 5 authoritative with respect to tobacco smoke chemistry?
09:37:02 6 A No.
09:37:02 7 Q If I ask you to list who you thought were the
09:37:11 8 top five researchers in the area of tobacco smoke
09:37:14 9 chemistry, would you be able to do that?
09:37:17 10 MR. McGUIRE: Based on what criteria? Vague,
09:37:19 11 overbroad.
09:37:20 12 MR. KODSI: Based on whatever criteria the
09:37:23 13 doctor wishes to employ.
09:37:24 14 MR. McGUIRE: Okay. Use employed by
09:37:28 15 nontobacco industry.
09:37:31 16 MR. KODSI: Well, I said the doctor, Mickey.
09:37:33 17 Not whatever criteria you wish.
09:37:35 18 MR. McGUIRE: You did say the doctor.
09:37:37 19 Anyway, let's go back to the question.
09:37:38 20 BY MR. KODSI:
09:37:38 21 Q Yeah. Why don't -- Dr. Nazaroff, if you have
09:37:42 22 criteria in mind for who you think the top researchers are
09:37:47 23 in tobacco chemistry, you can tell me what the criteria
09:37:50 24 are and who you think those people would be.
09:37:52 25 MR. McGUIRE: If he has one.
09:37:53 26 BY MR. KODSI:
09:37:53 27 Q If you have one.
09:37:54 28 A I -- I -- could we re-ask the first question,

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09:38:01 1 if that's the one that's still on the table. On this
09:38:05 2 topic.

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09:38:05 3 MR. KODSI: Sure.
09:38:06 4 Could you read that back.
09:38:07 5 (The following question was read by the
09:38:07 6 reporter:
09:38:07 7 "Q If I ask you to list who you thought were
09:38:07 8 the top five researchers in the area of tobacco smoke
09:38:07 9 chemistry, would you be able to do that?")
09:38:07 10 THE WITNESS: No.
09:38:32 11 MR. KODSI: Okay.
09:38:37 12 BY MR. KODSI:
09:38:37 13 Q Let me ask you this: Do you recognize
09:38:41 14 Dr. Michael Ogden as an expert on tobacco smoke
09:38:44 15 chemistry?
09:38:46 16 MR. McGUIRE: Hold on a second.
09:38:59 17 Sorry.
09:39:00 18 MR. KODSI: We have to wait for Mickey to
09:39:02 19 enter his objection on the report.
09:39:04 20 MR. McGUIRE: I'm going to object. Calls for
09:39:06 21 a legal conclusion as far as what an expert is.
09:39:08 22 You can answer.
09:39:09 23 There is no foundation. This gentleman is
09:39:11 24 not a lawyer.
09:39:12 25 THE WITNESS: The answer is no.
09:39:13 26 BY MR. KODSI:
09:39:13 27 Q Do you know who Dr. Michael Ogden is?
09:39:15 28 A I've never met him.

09:39:16 1 Q Are you familiar with his work?
09:39:18 2 A Some of it.
09:39:21 3 Q And when you said "the answer is no," is it
09:39:24 4 your opinion that he does not have expertise in tobacco
09:39:28 5 smoke chemistry?
09:39:29 6 A No, that's not my opinion.
09:39:31 7 Q All right. I guess I'm unclear as to what
09:39:33 8 you meant by the "no."
09:39:34 9 Is it that you didn't understand my
09:39:36 10 question?
09:39:37 11 MR. McGUIRE: You said does he recognize him
09:39:39 12 as being the top expert. His answer was --
09:39:43 13 MR. KODSI: I didn't say the top.
09:39:45 14 BY MR. KODSI:
09:39:45 15 Q Do you recognize Dr. Ogden as being an expert
09:39:48 16 on tobacco smoke chemistry?
09:39:51 17 MR. McGUIRE: Same objection.
09:39:52 18 THE WITNESS: And I answered that "no."
09:39:53 19 BY MR. KODSI:
09:39:53 20 Q Why not?
09:39:56 21 MR. McGUIRE: Argumentative.
09:40:01 22 THE WITNESS: I've spent little time reading
09:40:05 23 work that he's been the lead author on, and I'm not
09:40:10 24 sufficiently aware of his credentials or accomplishments
09:40:13 25 to come to that conclusion or to have an opinion.
09:40:17 26 BY MR. KODSI:
09:40:17 27 Q I understand.
09:40:18 28 What about Dr. Roger Jenkins?

09:40:20 1 MR. McGUIRE: What about him? What's the
09:40:21 2 question?
09:40:21 3 BY MR. KODSI:
09:40:21 4 Q Same question: Do you recognize him as an
09:40:23 5 expert in the field of tobacco smoke chemistry?
09:40:26 6 MR. McGUIRE: Same objection.
09:40:32 7 THE WITNESS: Yes.

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09:40:32 8 BY MR. KODSI:
09:40:32 9 Q Let's switch topics. We've been talking
09:40:40 10 about chemistry and the makeup of ETS and tobacco smoke.
09:40:44 11 I want to switch to talking about ETS exposures.
09:40:48 12 How would you define the concept of exposure?
09:40:52 13 A Exposure is, as it's conventionally defined,
09:41:01 14 is -- well, the easiest way to express it is to say it's
09:41:07 15 the product of a level that's presented or in the
09:41:13 16 breathing zone -- let's say if it's an inhalation
09:41:16 17 exposure, the breathing zone of an exposed individual,
09:41:21 18 times the duration of that exposure.
09:41:23 19 Q And when you say the level that's presented,
09:41:30 20 you mean the concentration that's presented in the
09:41:35 21 breathing zone?
09:41:36 22 A That's correct.
09:41:37 23 Q So in its simplest sense, exposure is
09:41:39 24 concentration times duration?
09:41:41 25 A In conventional usage, yes.
09:41:44 26 Q Does exposure differ from dose?
09:41:47 27 A Yes.
09:41:47 28 Q In what ways?

09:41:50 1 A Dose, again, in conventional usage, takes
09:41:58 2 exposure the next step and tries to quantify the amount of
09:42:03 3 the contaminant that either gets into the body or is taken
09:42:08 4 up in the body.
09:42:12 5 Q Scientifically, how do you convert exposure
09:42:14 6 to dose?
09:42:15 7 A For an inhalation exposure --
09:42:17 8 Q Thank you for that clarification.
09:42:18 9 A -- that conversion would be made by
09:42:21 10 multiplying exposure times breathing rate.
09:42:25 11 Q Can you explain to me what you mean by
09:42:29 12 "breathing rate"?
09:42:30 13 A The volume of air per a period of time that
09:42:32 14 one inhales.
09:42:34 15 Q And that's frequently expressed in terms like
09:42:37 16 cubic meters per hour?
09:42:39 17 A That's correct.
09:42:39 18 Q Or liters per minute?
09:42:41 19 A Yes.
09:42:42 20 Q Now, if you -- if you calculate dose by
09:42:53 21 multiplying exposure times breathing rate, does that
09:42:58 22 assume that the individual retains 100 percent of what
09:43:03 23 they're exposed to?
09:43:03 24 A No.
09:43:04 25 Q Okay. Why not?
09:43:05 26 A The distinction is drawn between something we
09:43:11 27 might call presented dose and absorbed dose for an
09:43:15 28 inhalation exposure. The exercise that we just went

09:43:20 1 through to obtain dose would be termed presented dose, and
09:43:24 2 that's the amount that gets into the body. But only a
09:43:28 3 fraction of the contaminants inhaled may actually be taken
09:43:33 4 up by the respiratory tract or by the body. And so the
09:43:37 5 absorbed dose would be a fraction of the presented dose,
09:43:40 6 ranging from -- that fraction ranging from zero to one.
09:43:44 7 Q How do you convert presented dose to absorbed
09:43:51 8 dose for ETS?
09:43:56 9 A One would have to do it compound by compound
09:44:00 10 or at least to make a distinction between the particle
09:44:04 11 phase material and the gaseous species and then make
09:44:11 12 separate determinations for -- in the best way, for each

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09:44:18 13 of the gases and an overall determination for the
09:44:22 14 particles.
09:44:22 15 Q Why would it have to be done compound by
09:44:26 16 compound?
09:44:26 17 A Because the physical and the chemical
09:44:29 18 properties of the constituents of environmental tobacco
09:44:32 19 smoke lead to different fractional uptakes when you
09:44:36 20 breathe them.
09:44:37 21 Q And that relates to the point that
09:44:39 22 environmental tobacco smoke is a complex mixture of
09:44:43 23 several chemicals, correct?
09:44:44 24 A It's a mixture of many chemicals.
09:44:47 25 Q Do you have an opinion as to how many
09:44:49 26 chemicals have actually been identified in environmental
09:44:52 27 tobacco smoke?
09:44:55 28 A I've seen the number hundreds reported.

09:44:59 1 Q Do you know how many chemicals have been
09:45:04 2 identified in side stream tobacco smoke?
09:45:08 3 A I believe it to be in the same scale,
09:45:12 4 hundreds.
09:45:14 5 Q And do you have an opinion as to how many
09:45:16 6 chemicals have been identified in mainstream tobacco smoke?
09:45:19 7 A Well, I've read that the number there is
09:45:21 8 measured in thousands.
09:45:24 9 Q Does 5- to 6,000 sound right to you?
09:45:27 10 A The latest number I saw was 4,000.
09:45:29 11 Q 4,000.
09:45:41 12 And, actually, the number of transitions meld
09:45:44 13 to the next point.
09:45:46 14 When measuring ETS, is it your understanding
09:45:50 15 that you can't actually go out and measure it as a whole,
09:45:53 16 correct?
09:45:53 17 A That's correct.
09:45:54 18 Q We have to measure what are called markers?
09:45:58 19 A I'm sorry. But there's not a question in the
09:46:05 20 way you phrased it.
09:46:06 21 Q Okay. Well, it's your understanding that in
09:46:10 22 measuring ETS, people often measure individual markers
09:46:14 23 rather than try to measure ETS as a whole?
09:46:17 24 A Yes, that's correct.
09:46:18 25 Q Could you explain to me why that is?
09:46:21 26 A Analytically, it's quite a challenge to
09:46:30 27 measure hundreds of different compounds and very expensive
09:46:34 28 to do so. So if for no other reason than pragmatism, we

09:46:42 1 would like to be able to measure a much smaller number of
09:46:47 2 constituents than the total and use those as indicators of
09:46:52 3 the level of other compounds that are present.
09:46:56 4 Q When you measure a smaller number, how do you
09:46:59 5 use those as indicators of the level of other compounds
09:47:06 6 that are present?
09:47:07 7 A The -- probably the strongest approach --
09:47:09 8 well, certainly the strongest approach that's available
09:47:12 9 right now is through relative emission factors that is in
09:47:17 10 careful studies. People have measured the quantity of
09:47:22 11 compounds produced in environmental tobacco smoke to --
09:47:27 12 for a larger set of species. Not as large as the hundreds
09:47:31 13 that may be present in environmental tobacco smoke in
09:47:34 14 total, but numbers of tens of compounds.
09:47:44 15 And the relative amounts -- to the extent
09:47:49 16 that the relative amounts that are emitted are consistent
09:47:51 17 from one smoking episode to another, then we can use the

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09:47:55 18 marker compounds to provide a measure through adjusting
09:48:02 19 for the emission factors, to provide a measure of the
09:48:07 20 levels of these other compounds present in environmental
09:48:10 21 tobacco smoke in an indoor environment.
09:48:12 22 Q All right. Now, you said, "to the extent
09:48:14 23 that the relative amounts that are emitted are consistent
09:48:17 24 from one smoking episode to another."
09:48:19 25 What did you mean by that?
09:48:20 26 A Let's take an example, which may be the
09:48:26 27 easiest way to explain it. Benzene is a constituent of
09:48:35 28 mainstream, side stream, and environmental tobacco smoke.

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09:48:38 1 And it's a toxic air contaminant. And so we're interested
09:48:44 2 in the levels that are associated with benzene --
09:48:47 3 environmental -- the benzene exposure levels that are
09:48:50 4 associated with environmental tobacco smoke.
09:48:53 5 The -- many studies have reported levels of
09:49:02 6 nicotine or RSP or some other marker compound in
09:49:07 7 environmental tobacco smoke, and we would like to be able
09:49:11 8 to estimate the exposure to benzene in those same
09:49:15 9 settings.
09:49:15 10 So the way that I have done that is to take
09:49:26 11 the measured concentration of a tobacco marker, such as
09:49:30 12 nicotine, and multiply it by the ratio of benzene
09:49:34 13 emissions to nicotine emissions in environmental tobacco
09:49:37 14 smoke.
09:49:37 15 The -- that's a scientifically valid and
09:49:44 16 robust approach to the extent that that ratio is
09:49:47 17 reasonably consistent between the experiments that have
09:49:52 18 been done in laboratories where these emission factors
09:49:55 19 have been measured and what happens in a residence or some
09:50:01 20 other smoking environment.
09:50:02 21 Q Where do you get the benzene emissions and
09:50:09 22 nicotine emissions for ETS?
09:50:11 23 A I used two sets of studies. One by Daisey
09:50:16 24 and collaborators at the Lawrence Berkeley National
09:50:20 25 Laboratory, and the other reported in a paper by Martin
09:50:24 26 et al., Tobacco Industry Research.
09:50:27 27 Q The Martin paper was done at the laboratories
09:50:30 28 at R.J. Reynolds Tobacco Company?

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09:50:34 1 A As I recall.
09:50:34 2 Q Now, both of those studies, the Daisey and
09:50:39 3 the Martin study, were done in environmental chambers?
09:50:43 4 A That's correct.
09:50:44 5 Q And just so the record is clear and we're
09:50:46 6 all talking on the same page, what is your understanding
09:50:49 7 of the environmental chambers that those studies are
09:50:52 8 conducted in?
09:50:52 9 A These are test chambers. I know the
09:50:54 10 situation with the Daisey worked better and so on. But I
09:50:57 11 should focus on explaining that, at least to start.
09:51:04 12 This is a chamber designed and built for the
09:51:07 13 purpose of measuring emissions of pollutants from indoor
09:51:18 14 sources. So it's a room-sized chamber, 20 cubic meters in
09:51:22 15 volume. It has stainless steel surfaces which are
09:51:26 16 intended to not interact significantly -- at least, that
09:51:30 17 was the goal -- with the contaminants that are emitted.
09:51:36 18 And the basic procedure for environmental tobacco smoke
09:51:40 19 emission characterization involved smoking a small number
09:51:45 20 of cigarettes by machine, allowing only side stream smoke
09:51:51 21 in that case to be emitted into the interior space,
09:51:55 22 operating the chamber in an unventillated mode, and then

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after the smoking was completed, measuring the airborne concentrations of a number of specific constituents. And then inferring, based on the principle of mass concentration, what mass was emitted from smoking the cigarettes for these constituents.

Q If you know, why was the chamber operated in

an unventillated mode?

MR. McGUIRE: Calls for speculation.

THE WITNESS: I won't speculate. I don't know.

BY MR. KODSI:

Q You don't know. Okay.

Was that a study that you had any involvement with?

A No.

Q Now, you use the example of trying to determine benzene concentrations by using the nicotine in benzene emission factors, correct? That's where we started this whole discussion.

A That's correct.

Q If you used the nicotine emissions -- well, let me scratch that.

Nicotine emissions in a stainless steel chamber, would they absorb onto the stainless steel chamber?

A Yes, they do.

Q In a similar fashion to how they would absorb in the real world?

MR. McGUIRE: Well, what do you mean? In another -- in a real world steel chamber?

MR. KODSI: Good clarification, Mickey.

BY MR. KODSI:

Q Do they absorb in the stainless steel chamber the same way they would absorb in this room, for example?

A Probably not.

Q Would that have any impact on using nicotine emissions to calculate a constituent like benzene?

MR. McGUIRE: Calls for speculation.

THE WITNESS: It could, but it's something that I've considered. And I don't believe it does have a significant effect on the analyses that I've done.

BY MR. KODSI:

Q Okay. What considerations led you to that conclusion?

A There are really two lines of investigation. One is looking at ambient levels -- or indoor levels of nicotine in studies where enough is known about the smoking behavior to see whether emission factors in a real world setting are consistent with the emission factors measured in the laboratory.

The second line of investigation is based on research that I supervised where we've actually studied the interactions of nicotine, not only with stainless steel, but also with painted wallboard and with carpeting.

And the evidence from those two sets of investigations leads me to conclude that although one needs to be cautious in using nicotine as a marker, it can be done.

Q Now, in saying that one needs to be cautious about using nicotine as a marker, are there other markers for tobacco smoke that you think are better markers?

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09:55:43 28 MR. McGUIRE: Incomplete hypothetical.

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09:55:45 1 Better in what ways? You mean more accurate?
09:55:49 2 BY MR. KODSI:
09:55:49 3 Q Sure. That would be a good starting point.
09:55:54 4 That you think are more accurate.
09:55:55 5 A There are other markers that have been put
09:56:03 6 forward as candidates, as alternatives to nicotine, and
09:56:14 7 those markers have been used in some studies.
09:56:17 8 Q Are there criteria for what makes a more
09:56:24 9 accurate marker?
09:56:25 10 A There are criteria for what makes a good
09:56:28 11 marker.
09:56:29 12 Q Okay. Let's -- why don't you tell me what
09:56:33 13 those are.
09:56:33 14 A I'm not sure I can remember all of them, but
09:56:39 15 I'll tell you the ones that I do recall.
09:56:45 16 The compound should be emitted in fairly
09:56:51 17 constant proportions or fairly constant amounts from
09:56:54 18 different types of tobacco products. The compound should
09:57:03 19 be unique or nearly so to tobacco smoke. The levels that
09:57:12 20 are produced in an indoor environment should be readily
09:57:17 21 measured. I recall a National Academy of Science document
09:57:24 22 that listed four or, perhaps, five, and I don't know that
09:57:28 23 I've matched up with those. But I don't recall the last
09:57:30 24 few.
09:57:30 25 Q That was going to be my next question,
09:57:32 26 actually, was are you reciting, to your knowledge, what's
09:57:35 27 known as the NRC for criteria for what makes a good
09:57:39 28 marker?

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09:57:40 1 A That's what I was trying to recall, yes.
09:57:41 2 Q Okay. Should a good marker be representative
09:57:44 3 of both the vapor and particulate phases?
09:57:48 4 A That's not necessary, I don't think.
09:57:50 5 Q And should it be emitted at a constant
09:57:57 6 relationship to the constituents of interest that you're
09:58:00 7 trying to study?
09:58:01 8 A That -- yes. That's -- I mean, for it to be
09:58:04 9 a useful marker, that's something that you'd like it to --
09:58:08 10 a property you'd like it to have.
09:58:09 11 Q And focusing on those criteria, would benzene
09:58:12 12 make a good marker for environmental tobacco smoke?
09:58:15 13 A It doesn't satisfy all of the criteria.
09:58:18 14 Q Which ones -- why don't you walk me through
09:58:22 15 which ones it does and doesn't satisfy.
09:58:24 16 A Well, I think there's one that's
09:58:28 17 problematic. And that one is the whether benzene from --
09:58:36 18 whether tobacco smoke is the dominant source of benzene in
09:58:39 19 indoor environments.
09:58:42 20 Q Because benzene in indoor environments is
09:58:49 21 not unique to environmental tobacco smoke?
09:58:53 22 A That's correct.
09:58:54 23 Q And you were saying something about tobacco
09:58:57 24 smoke not being the dominant source of benzene.
09:59:00 25 Do you have an opinion for what -- as to what
09:59:04 26 percentage of indoor benzene concentrations are typically
09:59:08 27 contributed by environmental tobacco smoke?
09:59:13 28 MR. McGUIRE: You know, you've phrased your

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09:59:18 1 question different than his answer. He said there is some
09:59:21 2 question as to whether or not tobacco smoke is a
09:59:23 3 predominant source of benzene. He didn't say that it's

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09:59:26 4 not the dominant source, as you phrased your question, and
09:59:30 5 then asked another question.
09:59:31 6 MR. KODSI: All right. I'll be happy to --
09:59:33 7 MR. McGUIRE: Mischaracterizes his answer.
09:59:34 8 MR. KODSI: I'll be happy to ask it that way
09:59:37 9 first.
09:59:37 10 BY MR. KODSI:
09:59:37 11 Q Is tobacco smoke the dominant source of
09:59:39 12 benzene exposure in indoor environments?
09:59:42 13 MR. McGUIRE: Incomplete hypothetical.
09:59:45 14 You can answer if he's given you enough
09:59:49 15 information to answer the question.
09:59:50 16 THE WITNESS: I think the question would have
09:59:53 17 to be further qualified.
09:59:54 18 BY MR. KODSI:
09:59:54 19 Q Okay. In what way?
09:59:56 20 A Which indoor environment.
09:59:59 21 Q Okay. Can you give me an indoor environment
10:00:02 22 in which you would think that environmental tobacco smoke
10:00:08 23 would be the primary source of benzene in that
10:00:10 24 environment?
10:00:11 25 A Yes.
10:00:11 26 Q Okay. What would that be?
10:00:13 27 A Bingo parlor in Las Vegas.
10:00:19 28 Q Okay. And why would -- why --

10:00:23 1 A The last time I went to Las Vegas and saw
10:00:27 2 bingo, I couldn't see across the room.
10:00:29 3 Q And so in that environment, you would think
10:00:37 4 that the benzene from environmental tobacco smoke would be
10:00:41 5 higher than the benzene in the ambient air?
10:00:45 6 A That's correct.
10:00:46 7 Q Okay. Are you aware of any studies that have
10:00:50 8 actually gone in and measured benzene in an environment
10:00:56 9 where smoking is taking place to reach that conclusion?
10:01:00 10 A I'm sorry. There's a compound question in
10:01:05 11 there. I'm not sure --
10:01:06 12 Q Are you aware of any studies that have
10:01:08 13 actually measured benzene in an environment where smoking
10:01:11 14 is taking place?
10:01:12 15 A Yes.
10:01:12 16 Q And have any of those studies reached the
10:01:15 17 conclusion that the primary source of that benzene was
10:01:17 18 environmental tobacco smoke?
10:01:18 19 A Again, the -- without a qualifier for which
10:01:27 20 indoor environments we're speaking of, I can't answer the
10:01:33 21 question precisely.
10:01:35 22 Q Okay. Let me see if I can rephrase it.
10:01:40 23 You are aware of studies that have measured
10:01:43 24 benzene in environments where people are smoking?
10:01:46 25 A Yes, I am aware.
10:01:47 26 Q And you're aware of studies where they have
10:01:51 27 attempted to determine how much of that benzene was coming
10:01:54 28 from environmental tobacco smoke?

10:01:55 1 A Yes.
10:01:55 2 Q Of any of those studies, have the authors
10:01:58 3 concluded that the primary source of benzene in their
10:02:01 4 experiment was environmental tobacco smoke?
10:02:04 5 A I don't recall a study that concluded that,
10:02:09 6 but I have to qualify my answer to say that that's based
10:02:13 7 on average exposure conditions.
10:02:20 8 Q The studies you've reviewed are average

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10:02:24 9 exposure --
10:02:24 10 A My recollection of the conclusions of those
10:02:27 11 studies is their conclusions with respect to average
10:02:31 12 exposures.
10:02:32 13 Q Now, before I got off on the benzene tangent,
10:02:38 14 we were talking about what the marker criteria was and the
10:02:42 15 fact that there were other markers other than nicotine
10:02:45 16 that have been used in the literature.
10:02:47 17 What markers, in your opinion, are as good as
10:02:52 18 or possibly better than nicotine as far as quality when it
10:02:58 19 comes to markers for ETS?
10:03:05 20 MR. McGUIRE: If any.
10:03:05 21 BY MR. KODSI:
10:03:05 22 Q If any.
10:03:07 23 A Before I answer that question, can we -- is
10:03:16 24 it possible for us to go back to the criteria, because I
10:03:19 25 want to --
10:03:20 26 Q Sure.
10:03:21 27 A -- to be certain that if -- I don't recall
10:03:28 28 now whether you've asked me to -- whether these criteria

10:03:31 1 constitute a complete set, for example. And so I guess
10:03:37 2 what I'd like to do is have read back the questions
10:03:42 3 with respect to the criteria that we're looking at.
10:03:48 4 MR. KODSI: If we can -- let me see if I can
10:04:45 5 find them, too.
10:04:45 6 THE REPORTER: If I may ask, Doctor, are you
10:04:45 7 speaking of the original question regarding that and from
10:04:45 8 that point forward?
10:04:45 9 THE WITNESS: Right. Until we were no longer
10:04:45 10 talking about criteria. There was a series of two or
10:04:45 11 three questions.
10:04:45 12 MR. KODSI: Are we looking for the criteria
10:04:45 13 he listed?
10:04:45 14 THE WITNESS: The question that led in to my
10:04:45 15 listing criteria.
10:04:45 16 THE REPORTER: This might be better, then,
10:04:45 17 off the record than the colloquy with the reporter.
10:04:45 18 MR. KODSI: Yeah, let's go off the record.
10:04:45 19 VIDEOGRAPHER: We are off the record. The
10:04:45 20 time is 10:04.
10:04:45 21 (Discussion off the record.)
10:04:45 22 VIDEOGRAPHER: We are back on the record.
10:04:45 23 The time is 10:08.
10:04:45 24 MR. McGUIRE: Did my recitation of that
10:09:10 25 summary help at all, or are you still --
10:09:12 26 THE WITNESS: I think we're okay. It depends
10:09:14 27 on where we go now.
10:09:15 28 MR. KODSI: I'm going to try to ask a clearer

10:09:18 1 question, might be the way to do this.
10:09:19 2 We had gone off the record for a second
10:09:22 3 because I had asked a question about what are other
10:09:27 4 markers other than nicotine, and the doctor wanted to
10:09:30 5 review his prior testimony on how we discussed what the
10:09:33 6 marker criteria were.
10:09:35 7 BY MR. KODSI:
10:09:36 8 Q And my question, Doctor, is other than
10:09:40 9 nicotine, are there any markers that you have in mind that
10:09:42 10 you think are good markers for environmental tobacco
10:09:45 11 smoke?
10:09:46 12 A Yes.
10:09:46 13 Q And what would those be?

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10:09:49 14 A Respirable suspended particulate matter and
10:10:01 15 3-ethenylpyrridine.
10:10:03 16 Q And --
10:10:04 17 MR. McGUIRE: I'm going to belatedly object
10:10:08 18 on the basis that the question is vague and ambiguous in
10:10:10 19 that you have not specified whether he's talking about
10:10:13 20 good markers from the standpoint of acute exposure versus
10:10:18 21 chronic exposure or short-term versus long-term markers.
10:10:23 22 MR. LENDRUM: I'm going to object to the
10:10:26 23 speaking objections that have been inserted throughout the
10:10:29 24 deposition. I think they're inappropriate.
10:10:30 25 MR. KODSI: I'm actually going to take heed
10:10:37 26 on that one because I'm interested to see if the doctor
10:10:39 27 does differentiate.
10:10:40 28 BY MR. KODSI.

10:10:40 1 Q Do you think that in analyzing what makes a
10:10:43 2 good marker, that it makes a difference whether you're
10:10:45 3 looking at chronic versus acute exposures?
10:10:52 4 A No, I don't think so.
10:10:53 5 Q Does it make a difference whether you are
10:11:00 6 looking at short-term versus long-term exposures?
10:11:06 7 A I don't know what we mean by short-term and
10:11:08 8 long-term. So I -- that would have to be clarified, I
10:11:13 9 think.
10:11:13 10 Q Well, let me just give an example.
10:11:16 11 If in one study I wanted to measure
10:11:20 12 environmental tobacco smoke concentrations for one hour,
10:11:23 13 and in another study I wanted to measure it all day long,
10:11:27 14 does that in any way scientifically impact on the quality
10:11:31 15 of the markers I choose?
10:11:33 16 A Or the choice of a marker?
10:11:34 17 Q The choice of a marker.
10:11:36 18 A Yes.
10:11:36 19 Q Okay. In what way?
10:11:38 20 A With something as short as an hour, the
10:11:41 21 dynamic behavior of a compound like nicotine, its tendency
10:11:50 22 to absorb and desorb from surfaces becomes an issue.
10:11:57 23 Q So if you're using nicotine as a marker, do
10:12:01 24 you have in mind a time period that you should at least be
10:12:04 25 measuring for?
10:12:06 26 A Yeah. Well, yes, I do. A time that's longer
10:12:11 27 than the episode between cigarettes being smoked. A time
10:12:18 28 that's longer than the time for indoor air to be replaced

10:12:21 1 with outdoor air. Those things end up turning out to be
10:12:25 2 measured in hours. And so if one is doing a day-long
10:12:29 3 exposure assessment or a half day or longer, then I think
10:12:33 4 nicotine could be successfully used.
10:12:36 5 Q You listed RSP, 3-ethenylpyrridine, and we've
10:12:46 6 talked about nicotine.
10:12:48 7 Are you familiar with the analytical methods
10:12:51 8 that are used to measure any of those three substances?
10:12:56 9 A Yes.
10:12:56 10 Q And maybe I should have asked this first.
10:13:02 11 When I say "analytical method," what do you
10:13:05 12 understand that I mean by "analytical method"?
10:13:10 13 A Well, narrowly, it would be once you've
10:13:13 14 collected a sample, what kind of instrumental work do you
10:13:16 15 need to do to quantify how much you've collected.
10:13:20 16 Q And -- now, you've measured nicotine before,
10:13:25 17 correct?
10:13:26 18 A No. Actually, I personally have never

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10:13:28 19 measured nicotine.
10:13:29 20 Q Has anyone in your laboratory --
10:13:31 21 A Yes.
10:13:32 22 Q -- that you work with?
10:13:33 23 A Yes.
10:13:33 24 Q Do you know what analytical method they used?
10:13:36 25 A Gas chromatography followed by a detection
10:13:45 26 technique that can either be nitrogen specific or mass
10:13:49 27 spectrometry.
10:13:53 28 Q And is that a method that they developed at

10:13:56 1 your laboratory, or one they got from somewhere else?
10:13:59 2 A I actually don't know.
10:14:04 3 Q Now, my understanding -- and correct me if
10:14:07 4 I'm wrong -- is that there are organizations in this
10:14:11 5 country and in the world that actually validate analytical
10:14:15 6 methods of measurement that people can then use when
10:14:18 7 they're studying substances like nicotine or benzene.
10:14:21 8 Is that an accurate description of how
10:14:25 9 scientists get analytical methods?
10:14:28 10 MR. McGUIRE: No foundation.
10:14:34 11 THE WITNESS: I don't believe so. But I'm
10:14:35 12 not -- maybe if you ask the question in a different way,
10:14:40 13 I'll understand more clearly.
10:14:42 14 BY MR. KODSI:
10:14:42 15 Q Are you familiar with the Association of
10:14:44 16 Official Analytical Chemists?
10:14:46 17 A No.
10:14:47 18 Q Are you familiar with the International
10:14:49 19 Standards Organization?
10:14:51 20 A Yes.
10:14:51 21 Q And where does your understanding of what the
10:14:56 22 International Standards Organization does?
10:14:58 23 A I have no understanding of it.
10:15:01 24 Q Okay. How about the American Society for
10:15:04 25 Testing and Materials, otherwise known as ASTM.
10:15:10 26 Are you familiar with them?
10:15:11 27 A Yes, I am.
10:15:12 28 Q Do you have an understanding of what they do?

10:15:14 1 A Something of an understanding, at least a
10:15:18 2 partial understanding.
10:15:19 3 Q Are you familiar that they have standard
10:15:22 4 analytical methods that they recommend scientists use when
10:15:27 5 conducting studies?
10:15:33 6 A I can answer "yes" to the first part of that
10:15:36 7 question, but not to the whole question.
10:15:38 8 Q Well --
10:15:39 9 MR. McGUIRE: Maybe there's a semantic
10:15:41 10 problem going on here.
10:15:42 11 When you say "standard analytical methods,"
10:15:45 12 do you mean testing protocols? Is that the same to you?
10:15:48 13 MR. KODSI: Testing protocols. That's the
10:15:51 14 same thing.
10:15:51 15 MR. McGUIRE: Okay.
10:15:53 16 BY MR. KODSI:
10:15:53 17 Q For example, are you familiar with the ASTM
10:15:56 18 analytical method for nicotine?
10:15:59 19 A No.
10:15:59 20 Q Okay. What about for any other constituent
10:16:03 21 in tobacco smoke?
10:16:04 22 A No.
10:16:05 23 Q All right. Now, we spent a lot of time

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talking about markers, and I've been focusing primarily on markers that are measured in air.
Are there other ways to measure markers for environmental tobacco smoke?
A Sure. And you're probably referring to

cotinene.
Q Right.
Biological markers?
A Yes.
Q What is cotinene?
A Cotinene is a metabolic byproduct of nicotine.
Q Is cotinene specific to tobacco?
A Not completely.
Q Is it specific to nicotine?
A I don't know.
Q Now, you used the phrase "metabolic byproduct," just so that I understand the record, what do you mean by a "metabolic byproduct"?
A When chemicals enter the body, they're subjected to chemical reactions that are carried out by enzymes, which are chemical catalysts or biological catalysts produced in our body. And that causes these chemicals to change their form. That's -- that process is called metabolism, and nicotine is subject to that process. And it's converted in that process to cotinene.
Q Now, do individuals all metabolize nicotine the same way?
A According to what I've read, no.
Q And I guess what I'm getting at there, to make sure, if you measure nicotine exposure in the air in this room, we would all have similar -- similar exposures to nicotine airborne, correct?

A Subject to some qualifications, but, yes.
Q But we may not all have the same cotinene measurements if someone took a cotinene sample?
A Well, certainly not, because cotinene has a biological residence time that's closer to a day. And we haven't been in this room for more than just about an hour.
Q That's a good point. And I want to go back and talk about the biological residence time. But let's assume in my hypothetical that none of us had any cotinene in our system prior to arriving in this room.
A Then we probably still wouldn't, right?
Q Yeah. If we were exposed to the same level of nicotine, we probably still wouldn't have the same cotinene if we subsequently took a cotinene test, correct?
A Yeah. But if I followed your question literally, I presume we would have no cotinene in our bodies or negligible amounts now anyway, because there is no environmental tobacco smoke, to my knowledge or expectation, in this room.
Q Right. I guess I should have included in my hypothetical that we had some -- and I think I actually did -- that we had some smoking going on in this room.
A Okay. So if -- why don't you ask the question now.
Q Sure. Let me ask it.
I want you to assume that we all entered this room with absolutely zero cotinene in our bodies.

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10:19:24 A Okay.
10:19:24 Q And we sat in this room. There are six of us, maybe seven. And we sat in this room. And we were exposed to tobacco smoke for four or five hours, all to the same concentration of nicotine.
10:19:36 We would all be exposed to the same concentration of nicotine, but we would not necessarily all have the same amount of cotinene in our bodies; is that correct?
10:19:44 A That's my expectation.
10:19:46 Q And --
10:19:48 MR. McGUIRE: Go ahead.
10:19:49 BY MR. KODSI:
10:19:49 Q And why is that true, or why is that your expectation?
10:19:52 A There are a few contributing factors. We may breathe at different rates. So the doses would be different. The presented doses would be different even if the exposures are the same. We may have different respiratory uptake of nicotine. It's just depending on the details of the quality of our lung tissue.
10:20:17 And then our bodies would have different rates of processing or converting the nicotine into cotinene.
10:20:23 Q And you talked also earlier about the fact that we would all have -- we have cotinene in our body for up to a day.
10:20:35 Is that what's called a half life?

10:20:38 A Well, the half life is a more precise measure than what I indicated. That is, the half life would refer to specifically how long it takes to excrete half of a charge of cotinene in the body.
10:20:59 Q Do you know what is cotinene's urinary half life?
10:21:07 A No.
10:21:08 Q Now, in measuring exposure in an indoor environment, what are the different factors that affect how high or low that exposure is? And I know that calls for a potential laundry list.
10:21:37 A I'm puzzled by one thing in your question.
10:21:44 Q Sure. Sure.
10:21:45 A And that's the word "measuring."
10:21:47 Do you really mean -- I mean, when I think of measuring, I think of going out and collecting a sample and then subjecting it to analysis. And if you collected the sample accurately, there is --
10:21:59 Q Good point.
10:22:00 A -- nothing that determines the exposure other than that result.
10:22:03 Q All right. Good point.
10:22:06 What are the factors that affect how high or low ETS exposure in a given environment might be?
10:22:13 A The --
10:22:16 MR. McGUIRE: Cumulative. Much of your questions are addressed in the first two sessions of this deposition.

10:22:23 You can answer.
10:22:24 THE WITNESS: The dominant factors are the number of cigarettes that are smoked indoors per unit of time, the size of the indoor environment, and the rate of

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10:22:42 5 ventilation, that is, replacement of indoor air with
10:22:46 6 outdoor air. And then the extent of occupancy.
10:22:51 7 To get to exposure, we have to know not only
10:22:53 8 what the concentrations are, but who was exposed and for
10:22:57 9 how long. Then the emissions, themselves. That is, if
10:23:06 10 you know the number of cigarettes that are smoked per unit
10:23:09 11 of time, you need to know how much of a particular
10:23:11 12 species -- it depends on what units you use to measure --
10:23:17 13 what units you use to measure exposure. But if it's
10:23:20 14 exposure to a particular compound, then you need an
10:23:22 15 emission factor.
10:23:23 16 BY MR. KODSI:
10:23:23 17 Q The length of time that you spend in the
10:23:25 18 environment would affect your exposure?
10:23:27 19 A Yes.
10:23:27 20 Q How well the air is mixed in that environment?
10:23:30 21 A Yes.
10:23:31 22 Q Just the general airflow patterns in the room
10:23:34 23 or environment would affect exposure?
10:23:37 24 A Could.
10:23:38 25 Q The deposition of constituents could affect
10:23:42 26 exposure?
10:23:43 27 A Could. But not likely to be a major factor.
10:23:46 28 Q Avoidance behavior by nonsmokers could affect

10:23:50 1 their exposure?
10:23:51 2 A Yes.
10:23:51 3 Q And, actually, attempts by smokers to avoid
10:23:55 4 exposing nonsmokers could affect nonsmoker exposure to
10:24:01 5 ETS?
10:24:01 6 A Yes.
10:24:01 7 Q Are there any others?
10:24:04 8 A Social interactions which would tend to
10:24:08 9 place -- or could tend to place nonsmokers in closer
10:24:12 10 proximity to smokers than the average condition for a
10:24:15 11 house.
10:24:15 12 Q And with all these factors, just so I
10:24:20 13 understand, if all you know is the number of smokers in an
10:24:23 14 environment, you would agree that would be pretty
10:24:26 15 difficult to determine what the ETS exposure in that
10:24:29 16 environment was?
10:24:33 17 A Literally, I know nothing except --
10:24:36 18 Q Just the number of smokers.
10:24:38 19 A -- just the number of smokers? I don't know
10:24:42 20 anything else about the environment, even about the nature
10:24:44 21 of what the environment is?
10:24:46 22 Q Okay. Let's assume you know of a number of
10:24:48 23 smokers in a residential environment.
10:24:50 24 A Then I could make an estimate.
10:24:52 25 Q How would you go about doing that?
10:24:53 26 A Well, it -- the first -- we should narrow
10:25:04 27 what it is that I'm trying to estimate, I think, first.
10:25:08 28 The -- is it -- please go back and restate or

10:25:20 1 rephrase your question.
10:25:21 2 Q Okay. Actually, you made a point that I
10:25:25 3 think I do need to go back and do something else.
10:25:28 4 When we talk about defining exposure, which I
10:25:32 5 think is what you were getting at, what is it I'd be
10:25:36 6 asking you to estimate? How do you define ETS -- let's
10:25:41 7 say that there is smoking going on in this room and you
10:25:44 8 wanted to report --
10:25:45 9 A Yes.

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10:25:45 10 Q -- the ETS concentrations.
10:25:48 11 What scientific terminology do you use to
10:25:51 12 report ETS concentrations in an environment?
10:25:54 13 MR. McGUIRE: Okay. This is not exposure.
10:25:56 14 This is concentration?
10:25:57 15 BY MR. KODSI:
10:25:57 16 Q I'm talking about concentration.
10:25:59 17 A I would tend not to -- more often than not,
10:26:08 18 anyway. It depends on the context. But the first thing I
10:26:11 19 would think of is reporting concentrations of specific
10:26:13 20 constituents.
10:26:14 21 Q And you would report concentrations of
10:26:16 22 constituents in terms like micrograms per cubic meter?
10:26:21 23 A Yeah. Mass per volume, or if it's a gaseous
10:26:24 24 constituent, we sometimes use something called a mixing
10:26:29 25 ratio or a mole fraction. There, the units would be parts
10:26:34 26 per million or parts per million.
10:26:36 27 Q And that's how concentration is reported for
10:26:39 28 constituents or markers --

10:26:40 1 A That's correct.
10:26:41 2 Q -- for tobacco smoke?
10:26:47 3 MR. McGUIRE: The answer that the witness
10:26:49 4 gave about that's how it's reported, is that the mole
10:26:54 5 fraction that you said yes to, or is that the mass per
10:26:58 6 volume, or both?
10:26:59 7 THE WITNESS: Both. Either.
10:27:00 8 MR. McGUIRE: Thank you.
10:27:00 9 MR. KODSI: It's both. That's how I
10:27:02 10 interpreted it.
10:27:03 11 BY MR. KODSI:
10:27:03 12 Q Now, when reporting exposure, what you would
10:27:14 13 add is just a time element to that? You would say
10:27:17 14 microgram hours per cubic meter, for example, correct?
10:27:20 15 A Yes. With a qualification. And the
10:27:24 16 qualification is that the work that I did in my original
10:27:30 17 declaration, on the Prop 65 case, followed a use of
10:27:40 18 language that was prescribed in Prop 65 where exposures
10:27:45 19 are measured in language that I've referred to earlier as
10:27:50 20 a present dose, that is, the mass of a contaminant taken
10:27:55 21 in per time per day.
10:27:56 22 And so when I carried out an exposure
10:28:00 23 evaluation in the context of this case, I did it measuring
10:28:05 24 things in units of mass of contaminant or cigarette
10:28:11 25 equivalents worth of environmental tobacco smoke inhaled
10:28:15 26 per day.
10:28:15 27 Q That's where I was headed.
10:28:17 28 There are other ways -- other ways to report

10:28:19 1 are to use terms like cigarette equivalents and a mass per
10:28:23 2 day when you're talking about exposure?
10:28:25 3 A I don't --
10:28:28 4 MR. McGUIRE: Vague.
10:28:29 5 THE WITNESS: I don't --
10:28:29 6 MR. McGUIRE: Vague.
10:28:30 7 THE WITNESS: I don't understand what the
10:28:31 8 question is asking.
10:28:32 9 BY MR. KODSI:
10:28:32 10 Q Okay. We've talked about you can report
10:28:35 11 exposure in a term microgram hours per cubic meter for a
10:28:40 12 particular chemical, correct?
10:28:42 13 A Yes.
10:28:42 14 Q Other ways to report exposure are to use

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terminology such as cigarette equivalents for a particular chemical?
A One could make a connection to -- I -- usually when that's done, people are trying to make a connection to what a smoker takes in as mainstream smoke.
Q When you say "usually," what other way is there?
A Well, the difficulty with the way in which that idea has been used in the literature that I've seen is that the measure for cigarette equivalents per day is based usually on a single constituent such as either nicotine or RSP or particulate matter and doesn't take account of the fact that the relative amounts of different constituents in environmental tobacco smoke can be quite

different than they are in mainstream smoke.
So there is a potential for that measure or that metric to be misleading.
MR. KODSI: I'm going to switch topics, and we've been going at this for about an hour and 15. It's a good time to take a break.
MR. McGUIRE: Thanks.
VIDEOGRAPHER: We are off the record. The time is 10:29.
(Recess.)
VIDEOGRAPHER: We are back on the record. The time is 10:51.
(Exhibit 558 was marked for identification.)
BY MR. KODSI:
Q Okay. Doctor, let me hand you what's been marked as Exhibit 558. I'll ask if you have seen that document before.
A Not before this morning, no.
Q Okay. You understand that this is a description of the experts and their testimony for the plaintiffs in this case?
A Yes.
Q And if you turn to page 5 -- and it goes on to page 6. There is a description of the testimony that you're going to offer in this case.
A Yes, I see that.
Q If you look under where it says "William W. Nazaroff," paragraph B, it says that "Dr. Nazaroff is

expected to testify regarding the daily exposure of Californians to ETS in their homes; including the concentrations of ETS constituents and the duration of exposure."
That's correct?
A Yes.
Q We'll start out generally, and we'll get more specific.
Can you describe for me generally what you anticipate testifying about there?
A Generally, it will have to do with the number of Californians who are exposed in their homes to environmental tobacco smoke and the levels of exposure that occur to tobacco smoke measured in toto, or as a whole, quantified in terms of cigarette equivalents of ETS per day, and also in terms of levels of specific constituents.
Q Anything else?
A I'm sorry. Anything else in general or

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10:53:55 20 anything else --
10:53:55 21 Q In general.
10:53:56 22 A I'll have some comments on the significance
10:54:01 23 of those exposures with respect to possible health
10:54:08 24 outcomes.
10:54:15 25 And the extent to which California exposures
10:54:22 26 are like or unlike those in other parts of the country,
10:54:29 27 which pertains to the issue of whether epidemiology
10:54:32 28 conducted in the United States can be meaningfully applied

10:54:38 1 to California -- estimating risks from Californians -- for
10:54:41 2 Californians.
10:54:42 3 Q Now, do you consider yourself to have
10:54:44 4 expertise in epidemiology?
10:54:45 5 A No.
10:54:46 6 Q And when --
10:54:49 7 MR. McGUIRE: Belatedly move to strike.
10:54:52 8 Calls for a legal conclusion.
10:54:53 9 BY MR. KODSI:
10:54:53 10 Q You indicated that you might discuss the
10:55:00 11 significance of exposures with respect to health
10:55:04 12 outcomes. Now, I don't want to revisit a lot of what was
10:55:08 13 done back in August on this topic.
10:55:12 14 But you don't view yourself as having
10:55:15 15 expertise in health effects, do you?
10:55:17 16 A No.
10:55:18 17 Q And you don't view yourself as having
10:55:20 18 expertise in risk assessment?
10:55:22 19 MR. McGUIRE: Same objection. As far as what
10:55:24 20 expertise means in the legal sense.
10:55:26 21 You can answer.
10:55:27 22 THE WITNESS: Yeah, that -- that, I'm not
10:55:30 23 willing to concede. I mean, I think I understand the risk
10:55:33 24 assessment arena reasonably well.
10:55:36 25 BY MR. KODSI:
10:55:36 26 Q You're familiar with how to plug exposure
10:55:47 27 values into a risk assessment, correct?
10:55:50 28 A Yes.

10:55:50 1 Q But as far as evaluating whether a chemical
10:55:54 2 can actually cause a particular health effect, that's
10:55:57 3 outside your expertise? Isn't it?
10:55:59 4 A I'm not a toxicologist, and I'm not expert in
10:56:04 5 that area. That's correct.
10:56:05 6 Q I want to go through each of those general
10:56:10 7 opinion topics that we just talked about. The first one,
10:56:14 8 as I wrote it down, was that you have opinions about the
10:56:18 9 number of Californians exposed in their homes.
10:56:22 10 What are your opinions there?
10:56:24 11 A Well, as set out in my declaration in advance
10:56:30 12 of the first deposition --
10:56:32 13 MR. McGUIRE: This is cumulative. This is
10:56:35 14 covering two days' worth of questioning from Mr. Cafferty.
10:56:41 15 Go ahead.
10:56:43 16 THE WITNESS: I believe that approximately 3
10:56:45 17 million Californians are exposed regularly to tobacco
10:56:51 18 smoke in their homes.
10:56:52 19 BY MR. KODSI:
10:56:52 20 Q I can try and cut this short too.
10:56:55 21 Have you done any additional work on that
10:56:58 22 opinion since you were deposed in August of 1999?
10:57:03 23 A That opinions being the number of
10:57:05 24 Californians --

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10:57:06 25 Q The number of Californians exposed in their
10:57:08 26 homes.
10:57:08 27 A No, I have not.
10:57:09 28 Q Has your opinion changed in any way since you

10:57:13 1 gave it on August 1999, on the number of Californians
10:57:19 2 exposed in their homes?
10:57:20 3 A To the best of my recollection as to what my
10:57:22 4 opinion was then, no.
10:57:24 5 Q Okay. Let's talk about the levels of
10:57:27 6 exposure.
10:57:31 7 Have your opinions regarding the levels of
10:57:33 8 exposure for Californians in their homes changed since
10:57:37 9 your August 1999 deposition?
10:57:41 10 A Not with respect to mean exposure or median
10:57:47 11 exposure, but I've now been asked to make some
10:57:49 12 calculations or estimates with respect to populations that
10:57:53 13 may be exposed at higher levels than the mean.
10:57:56 14 Q And what would those calculations be?
10:58:03 15 MR. McGUIRE: Can he show you a document so
10:58:07 16 that you can go through it?
10:58:09 17 BY MR. KODSI:
10:58:09 18 Q Do you have a document with you?
10:58:13 19 MR. McGUIRE: I have a copy here that he can
10:58:15 20 identify, and I sent it to Pat. Pat has a copy.
10:58:18 21 MR. KODSI: Let me see if it's the same
10:58:20 22 copy. I may have to let Pat do that later.
10:58:23 23 MR. McGUIRE: I'm giving you mine.
10:58:23 24 MR. CAFFERTY: I have a copy that he can
10:58:26 25 mark, Mickey.
10:58:27 26 MR. McGUIRE: He can mark this. That's all
10:58:29 27 right.
10:58:29 28 MR. CAFFERTY: Maybe we can hold off on that,

10:58:32 1 maybe explore the other opinions and then we can come back
10:58:35 2 to that one.
10:58:36 3 MR. McGUIRE: Just for foundation, so that we
10:58:38 4 know what your answer is, if you wanted, you can show him
10:58:41 5 that. He can reference the Bates numbers, and then you
10:58:43 6 can go on.
10:58:45 7 MR. KODSI: Yeah. I think we should probably
10:58:47 8 go ahead and mark it.
10:58:50 9 Do you mind if I mark your copy, Mickey?
10:58:53 10 MR. McGUIRE: No.
10:58:53 11 MR. KODSI: Why don't we -- all right. You
10:58:56 12 gave me the stickers.
10:58:57 13 (Exhibit 559 was marked for identification.)
10:58:57 14 BY MR. KODSI:
10:58:57 15 Q Dr. Nazaroff, I'm handing you what's been
10:59:04 16 marked as Exhibit 559. And just let me ask you if you
10:59:10 17 recognize that.
10:59:11 18 A Yes, I do.
10:59:12 19 Q Could you just generally describe for me what
10:59:15 20 that document entails.
10:59:16 21 A This document calculates or estimates
10:59:22 22 exposure to Californians who are exposed in their
10:59:27 23 residences at levels that are at the -- toward the upper
10:59:31 24 end of the distribution.
10:59:32 25 Q Do you have any opinions about the levels of
10:59:42 26 exposure incurred by Californians in their residences that
10:59:46 27 are not identified in Exhibit 559?
10:59:53 28 A Those that are present in my original

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declaration complement this, and they remain part of my opinion.

Q Okay. So other than your original declaration and Exhibit 559, that covers all the opinions you intend to offer about the levels of ETS that Californians are exposed to in their homes?

A I believe that to be the case, but there is a -- sort of a caveat or a qualifier. And that is that I've been asked to be available as a rebuttal witness to opinions that may be offered by experts on behalf of the defense. And since I don't know what those opinions are now, there may be some additional work and additional opinions necessary to react to that.

Q Right. That's a good clarification, and I appreciate that, Dr. Nazaroff.

Maybe what I should ask is, as we sit here today, with respect to the opinions that, today, you intend to offer at trial about the levels of ETS in residences in California, Exhibit 559 and the declaration you filed in this case contain all those opinions?

A With one further -- yes, with one further caveat.

Q Okay.

A And the further caveat is there may be foundational opinions that are implicit in the declaration or in this material that I will have to express in order to justify or substantiate or support the conclusions that I reach here.

Q I think I know what you mean by that, but could you maybe give me an example of a foundational opinion.

A Let me try. This may be an imperfect one, but let's say butadiene is a chemical or a compound that, in my opinion, there are exposures to Californians that are fairly high, associated with environmental tobacco smoke. And I didn't comment on, in my declaration, the chemical structure of butadiene or how it may be formed by cigarette smoke. And, yet, I may need to do that in order to fully justify the conclusions or substantiate the conclusions.

Q Okay. Now, you indicated also that you plan on testifying whether California is like or unlike other parts of the country with respect to ETS exposures in residences.

What are your opinions there?

A That the situation in California with respect to those exposed is sufficiently similar to the situation in other parts of the country that results -- exposure studies and epidemiological studies conducted elsewhere in the United States are pertinent to assessing the risk for those exposed in California.

Q And what analysis, if any, have you conducted to form the opinion that California is sufficiently similar to other parts of the country?

A The gist of my work in that context is embedded in my first declaration, which included analyses

that were specific to the state of California as well as analyses based on data collected elsewhere.

Q And I'm going to try to understand.

Is it your opinion that measured concentrations for ETS are similar in California with

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11:04:17 6 respect to measured concentrations outside the state of
11:04:20 7 California?
11:04:23 8 A I would draw a broader statement, which is
11:04:28 9 that the overall evaluation of exposure in California, as
11:04:38 10 compared to exposure elsewhere in the United States, leads
11:04:42 11 me to the conclusion that any differences that may be
11:04:47 12 present there are not sufficiently large to undermine the
11:04:51 13 use of epidemiology for the U.S. as a whole, to infer
11:04:56 14 what's going on in California.
11:04:57 15 Q What about the use of epidemiology outside
11:05:00 16 the U.S.?
11:05:00 17 A I haven't specifically considered that.
11:05:05 18 Q So you haven't done a comparison with respect
11:05:07 19 to California exposures and exposures outside the United
11:05:10 20 States?
11:05:11 21 A That's correct.
11:05:12 22 Q And do you feel such a comparison would be
11:05:15 23 necessary before drawing conclusions about the non-U.S.
11:05:20 24 epidemiology and how it might relate to Californians?
11:05:23 25 A I think it's preferable. "Necessary" is
11:05:27 26 probably too strong a word.
11:05:30 27 Q Why would it be preferable?
11:05:35 28 A The extrapolation that one would make in

11:05:41 1 taking epidemiological results from another society and
11:05:47 2 applying them to ours, one would like to have that
11:05:52 3 extrapolation supported with evidence to suggest that the
11:06:00 4 imputed exposures or the assumed exposures are comparable.
11:06:04 5 Q Now, when you say "the imputed exposures or
11:06:09 6 the assumed exposures," are you talking about those that
11:06:12 7 are reported in the epidemiologic literature?
11:06:18 8 A Well, one --
11:06:19 9 MR. McGUIRE: I'm sorry. Assumes a fact not
11:06:23 10 in evidence, that they are reported.
11:06:26 11 You can answer.
11:06:29 12 THE WITNESS: One could explore the issue or
11:06:35 13 investigate it with respect to common epidemiological
11:06:44 14 measures of exposure, or one could explore it with respect
11:06:47 15 to compounds or levels of specific constituents in
11:06:51 16 environmental tobacco smoke.
11:06:53 17 BY MR. KODSI:
11:06:53 18 Q When you say "with respect to common
11:07:05 19 epidemiologic measures of exposure," I'm not sure I
11:07:09 20 understand what you mean there.
11:07:10 21 A In epidemiologic studies -- I'll give you one
11:07:15 22 example to illustrate without trying to be comprehensive.
11:07:19 23 In epidemiological studies, one way that
11:07:24 24 people are categorized in terms of the level of exposure
11:07:27 25 that they have is whether or not they're married to a
11:07:32 26 smoker. And a further refinement would be how many years
11:07:38 27 did your spouse smoke and how many packs per day did they
11:07:42 28 smoke, and the product of those two numbers would be a

11:07:46 1 pack year of exposure, which is a particular metric.
11:07:54 2 Q Is that your understanding of how the
11:08:00 3 epidemiologic studies attempt to assess exposure to ETS?
11:08:06 4 A That's one approach that's used in
11:08:08 5 epidemiologic studies.
11:08:09 6 Q What are the other approaches?
11:08:10 7 A Well, since I'm not an epidemiologist, I
11:08:14 8 can't give you a comprehensive list.
11:08:17 9 Q Have you ever done an exposure assessment for
11:08:21 10 an epidemiology study?

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11:08:24 11 A No.
11:08:28 12 Q And you understand that at least the method
11:08:30 13 that you just described for exposure assessment in
11:08:34 14 epidemiology is done by questionnaire data?
11:08:39 15 A That's what -- I'm acquainted with studies in
11:08:43 16 which that's been done, yes.
11:08:44 17 Q Because in assessing exposure, epidemiology
11:08:49 18 studies rely on questionnaire data?
11:08:52 19 A I didn't say that. I said that --
11:08:57 20 Q Okay. Is that true?
11:08:58 21 A I'm aware of a study or some studies in which
11:09:02 22 questionnaire data has been used.
11:09:04 23 Q Is it true that epidemiology studies
11:09:06 24 typically rely on questionnaire data to assess ETS
11:09:09 25 exposure?
11:09:10 26 MR. McGUIRE: Vague as to what typically
11:09:12 27 means.
11:09:12 28 THE WITNESS: Well, in fact, I can't answer

11:09:14 1 it in the typical case, because I don't think I know the
11:09:16 2 epidemiological literature well enough to digest and
11:09:20 3 synthesize to that point.
11:09:22 4 BY MR. KODSI:
11:09:22 5 Q Okay. Now, in expressing your opinions on
11:09:37 6 the levels of exposure that California -- levels of ETS
11:09:43 7 exposure that Californians are exposed to in their
11:09:46 8 residences, what constituents of ETS have you calculated
11:09:53 9 exposure for?
11:09:59 10 A The best way for me to respond is that I've
11:10:01 11 done no -- I've added no further constituents beyond those
11:10:06 12 that are in the declaration originally submitted.
11:10:09 13 Q Okay. So the markers that you would use to
11:10:13 14 explain ETS exposure would be the same ones that were
11:10:15 15 identified in your declaration?
11:10:17 16 A Based -- in the context of my primary
11:10:24 17 testimony, yes. Again, in the rebuttal context, I
11:10:29 18 can't -- I don't know what I'm going to be called to do.
11:10:33 19 Q Are they also identified in Exhibit 559, the
11:10:44 20 markers that you intend to testify about?
11:10:47 21 A I guess I need some -- we moved from
11:10:50 22 compounds to markers without a specific question, and I
11:10:54 23 need some clarification, I think.
11:10:55 24 Q Okay. I guess I view those as identical,
11:11:01 25 when I say compounds that are constituents of ETS.
11:11:06 26 When you're going to -- when you've done an
11:11:12 27 analysis of the levels of ETS in residences and in
11:11:15 28 California, I assume you've done that analysis for

11:11:19 1 individual markers of ETS as well as ETS as a whole?
11:11:25 2 A Maybe I can answer in a way that helps make
11:11:30 3 the question --
11:11:31 4 Q Okay.
11:11:32 5 A -- more precise in the way I understand the
11:11:34 6 issue.
11:11:34 7 Q Sure.
11:11:35 8 A The term "marker," to me, applies something
11:11:39 9 that -- implies something that one would go out and
11:11:43 10 measure to characterize exposure. I have made
11:11:48 11 calculations based on concentrations, measured
11:11:51 12 concentrations of marker compounds. But I've also made
11:11:55 13 calculations and have opinions with respect to
11:11:57 14 constituents in environmental tobacco smoke that are not
11:12:01 15 used as markers, that are -- that have adverse health

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11:12:06 16 consequences associated with them. And that's part of
11:12:13 17 my -- that will be part of my testimony.
11:12:15 18 Q Okay. And when you say you have opinions
11:12:16 19 with respect to constituents of environmental tobacco
11:12:19 20 smoke that are not used as markers, what constituents do
11:12:23 21 you have opinions about?
11:12:25 22 A Those are the ones that are listed in the
11:12:28 23 original declaration, and they reappear in Exhibit 559.
11:12:33 24 Q Okay. That's what I was trying to get at.
11:12:35 25 So all the constituents that you intend to
11:12:38 26 testify about are in Exhibit 559?
11:12:41 27 A Yes. Qualified by my primary testimony.
11:12:43 28 Q Okay. Are there any -- maybe I can ask some

11:13:05 1 general questions for the constituents, and you let me
11:13:07 2 know if we need to do this individually or not.
11:13:10 3 But are there any constituents that you
11:13:12 4 intend to testify about that you feel are unique to
11:13:16 5 environmental tobacco smoke?
11:13:18 6 A Yes.
11:13:24 7 Q And which would those be?
11:13:27 8 A Nicotine.
11:13:30 9 Q Any others?
11:13:34 10 A I believe the nitrosamines to be unique to
11:13:40 11 environmental tobacco smoke, but that, I'm not certain of.
11:13:44 12 Q Which nitrosamines?
11:13:47 13 A Well, there are two that are included in my
11:13:50 14 evaluation.
11:13:50 15 Q And if you need to look on 559?
11:13:54 16 A Those are n-nitrosodimethylamine.
11:13:58 17 Q If we call that NDMA --
11:14:00 18 A That won't bother me.
11:14:02 19 Q Okay. Let's refer to that as NDMA. I know
11:14:05 20 the court reporter will appreciate that. What is the
11:14:07 21 other one?
11:14:08 22 A 'N'-nitrosopyrrolidine.
11:14:11 23 Q NPYR?
11:14:14 24 A Yes.
11:14:14 25 Q Is it your understanding that NDMA is unique
11:14:18 26 to tobacco smoke?
11:14:24 27 A I'm not certain.
11:14:25 28 Q What about NPYR?

11:14:27 1 A Also not certain.
11:14:28 2 Q Okay. Why is -- chemically, do you know why
11:14:40 3 there is NDMA in tobacco smoke?
11:14:44 4 A Approximately, yes.
11:14:47 5 Q Could you explain that for me.
11:14:49 6 A The -- one of the features of -- well, there
11:14:57 7 are two issues here, I guess, in context -- to put the
11:15:01 8 issue in context.
11:15:02 9 One is that incomplete combustion, combustion
11:15:08 10 under oxygen-starved conditions produces ring compounds
11:15:17 11 for any carbonaceous fuel. And combustion conditions,
11:15:21 12 when tobacco is burned in a cigarette, are not highly
11:15:25 13 favorable for complete combustion. There are many
11:15:28 14 products of incomplete combustion produced.
11:15:31 15 What distinguishes smoking tobacco or burning
11:15:33 16 tobacco from many other types of biomass is the very high
11:15:37 17 concentration of nitrogen that is present in the fuel.
11:15:40 18 So ring compounds can become nitrated in the
11:15:43 19 combustion process when tobacco is being burned, and so we
11:15:48 20 end up with nitrogen containing ring compounds and

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11:15:56 21 nitrogen containing products of incomplete combustion,
11:16:00 22 which we wouldn't tend to find in a pure hydrocarbon fuel
11:16:05 23 burned under poor conditions.
11:16:10 24 Q And the nitrogen containing compounds are
11:16:14 25 what form? The nitrosamines?
11:16:16 26 A Yes. Well, nitrosamines are an example of a
11:16:20 27 nitrogen containing product with an incomplete combustion.
11:16:23 28 Q Do you know if you would get the same

11:16:25 1 nitrogen containing compounds from incomplete combustion
11:16:30 2 if you burned leaves?
11:16:31 3 A I don't --
11:16:36 4 MR. McGUIRE: I'm sorry. Just a
11:16:37 5 clarification. Leaves, you mean nontobacco leaves?
11:16:40 6 MR. KODSI: Good point.
11:16:43 7 BY MR. KODSI:
11:16:43 8 Q Nontobacco leaves. Leaves in the yard after
11:16:45 9 you've raked them up.
11:16:46 10 A Right. It's my understanding that the
11:16:50 11 nitrogen content of ordinary vegetation leaves is much
11:16:54 12 lower than the nitrogen content of tobacco leaves. So
11:16:58 13 it's possible that one might get these compound produced,
11:17:01 14 but if so, they would be expected to be at much lower
11:17:05 15 levels.
11:17:05 16 Q What is the basis for that understanding
11:17:07 17 about the nitrogen content of tobacco leaves versus
11:17:10 18 nontobacco leaves?
11:17:12 19 A I can't cite a specific source, but I'm
11:17:17 20 generally knowledgeable in the area of combustion and air
11:17:20 21 pollution. And the chemical constituents of fuels is an
11:17:25 22 important element of that. And I'm aware that one of the
11:17:32 23 features of tobacco is its fairly high concentration of
11:17:38 24 nicotine, which is a nitrogen-containing organic
11:17:42 25 compound.
11:17:43 26 Q Now, when we were talking about whether NDMA
11:17:53 27 or NPYR were unique to tobacco, were you offering opinion
11:18:01 28 with respect to airborne exposures, or all exposures?

11:18:05 1 A I was only thinking of airborne exposures.
11:18:09 2 Q Do you know if there is NDMA in any of the
11:18:12 3 foods that we eat?
11:18:13 4 A I don't know.
11:18:14 5 Q The same for NPYR, you don't know?
11:18:17 6 A That's correct.
11:18:18 7 Q What about in water or fluids that people
11:18:22 8 drink?
11:18:22 9 A I actually came across information recently
11:18:29 10 suggesting people were concerned with NDMA in drinking
11:18:33 11 water, but I don't recall the details. So, apparently,
11:18:37 12 there is some.
11:18:38 13 Q Have you read anything about NDMA in
11:18:41 14 alcoholic beverages?
11:18:42 15 A No.
11:18:42 16 Q Okay. Do you remember where you saw the
11:18:59 17 information about NDMA in water?
11:19:01 18 A It was in my office at the university or in
11:19:06 19 the office suite that I occupy in the university.
11:19:10 20 Q Do you remember what document source or was
11:19:14 21 it a study? Was it a government publication?
11:19:17 22 A All I can recollect is that one of my
11:19:26 23 colleagues, who is a water chemist, has begun to get
11:19:30 24 involved either as a consultant or as a researcher on a
11:19:34 25 case where NDMA in drinking water is of concern.

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11:19:38 26 Q Just, briefly. I'm looking at page 2 of
11:20:12 27 Exhibit 559, which is Bates numbered --
11:20:17 28 MR. KODSI: Is that a "PX," Mickey?

11:20:19 1 MR. McGUIRE: Yep.
11:20:20 2 BY MR. KODSI:
11:20:20 3 Q -- PX-WWN-001436.
11:20:32 4 And let me know if I'm on a good page --
11:20:34 5 Table 1D lists several constituents in tobacco smoke. And
11:20:38 6 I know you talk about other -- other tables in this
11:20:42 7 document also list constituents.
11:20:44 8 But does Table 1D list all the constituents
11:20:48 9 that you formed opinions about, or do I need to look
11:20:50 10 somewhere else?
11:20:51 11 A No. Table 1D contains that list.
11:20:53 12 Q Okay. So just for -- I just want to have a
11:21:00 13 series of questions about each of these constituents.
11:21:02 14 Let's start first with acetaldehyde,
11:21:05 15 a-c-e-t-a-l-d-e-h-y-d-e, for the court reporter -- I said
11:21:10 16 that too fast.
11:21:13 17 How is that formed in tobacco smoke, if you
11:21:21 18 know?
11:21:22 19 A When a fuel that contains hydrogen and
11:21:30 20 carbon, which most biomass fuels contain, probably all
11:21:35 21 biomass fuels contain. Hydrogen and carbon, when that's
11:21:40 22 burned under conditions where combustion is incomplete, we
11:21:43 23 can end up with compounds like aldehydes, which belong to
11:21:48 24 a class called carbonyls.
11:21:51 25 Q So acetaldehyde is actually produced by the
11:21:56 26 burning of any organic material?
11:21:58 27 A Under conditions that don't favor complete
11:22:01 28 combustion.

11:22:02 1 Q What do you mean by not favoring complete
11:22:08 2 combustion?
11:22:08 3 A Thermodynamically, if you expose a material
11:22:15 4 that contains hydrogen and carbon in an oxygen -- an
11:22:21 5 adequate oxygen environment and a high temperature, that
11:22:25 6 is, basically have good combustion, the favored forms of
11:22:29 7 carbon and hydrogen to be emitted or as carbon monoxide
11:22:35 8 and water vapor, or water.
11:22:36 9 Any of several conditions can cause that
11:22:41 10 process to be halted partway and lead to the emission of
11:22:47 11 products -- what we call products of incomplete
11:22:50 12 combustion, and acetaldehyde is one of those.
11:22:54 13 Q Is acetaldehyde an ambient air constituent?
11:22:58 14 A It's an ambient air pollutant.
11:23:00 15 Q And does it come from sources other than
11:23:02 16 environmental tobacco smoke?
11:23:03 17 A In ambient air, sure.
11:23:05 18 Q What would an example of some of those
11:23:08 19 sources be?
11:23:08 20 A Motor vehicle exhaust is one. Wood smoke
11:23:13 21 from residential heating or just residential fireplace
11:23:17 22 burning is another.
11:23:17 23 Q And do you have an opinion as to how the
11:23:28 24 levels from automobile exhaust would compare with the
11:23:31 25 levels from ETS?
11:23:34 26 A No, I don't.
11:23:34 27 Q What about the levels from wood smoke, how
11:23:38 28 they would compare with ETS?

11:23:40 1 A Also no opinion.

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11:23:41 2 Q Okay. Let's go to the next chemical on the
11:23:45 3 list, which is acrylonitrile.
11:23:50 4 Are individuals exposed to acrylonitrile from
11:23:54 5 sources other than ETS?
11:23:55 6 A I suspect so, but I don't know what those
11:24:01 7 sources are.
11:24:02 8 Q Okay. What about benzene?
11:24:06 9 A Certainly, there are sources other than
11:24:09 10 environmental tobacco smoke, of benzene exposure.
11:24:12 11 Q And what would examples of those be?
11:24:15 12 A Gasoline. Benzene is a constituent in
11:24:18 13 gasoline, as it's formulated. So even the evaporation of
11:24:22 14 gasoline by itself can lead to exposure.
11:24:25 15 Q In other words, when you go to the gas pump
11:24:28 16 to put gas in your car, you're probably being exposed to
11:24:31 17 airborne concentrations of benzene?
11:24:33 18 A Probably. Although, the vapor recovery
11:24:35 19 devices that are present in California -- in most places
11:24:38 20 in California are intended to reduce that, the release of
11:24:43 21 gasoline vapors while you're refueling.
11:24:45 22 Benzene is also a product of incomplete
11:24:48 23 combustion, as was acetaldehyde. And so when you burn a
11:24:52 24 hydrocarbon fuel under poor combustion conditions, you
11:24:57 25 produce benzene.
11:24:58 26 Q Now, are individuals exposed to benzene from
11:25:00 27 their diet?
11:25:01 28 A I believe that to be the case, but I don't

11:25:03 1 know what -- at what levels.
11:25:05 2 Q And I guess when I say "diet," I would
11:25:08 3 include drinking as well as eating.
11:25:10 4 A Right.
11:25:10 5 Q And so you would agree -- are people exposed
11:25:13 6 to benzene from drinking as well as eating?
11:25:16 7 A I know that benzene in drinking water is of
11:25:19 8 some concern.
11:25:20 9 Q Okay. What do you mean by "of some concern"?
11:25:22 10 A I believe it to be on the list of regulated
11:25:30 11 species for drinking water.
11:25:31 12 Q And I should have asked those questions for
11:25:34 13 acrylonitrile and acetaldehyde.
11:25:40 14 Are you aware of dietary sources of
11:25:42 15 acrylonitrile?
11:25:43 16 A No, I'm not.
11:25:44 17 Q All right. Is that something that you've
11:25:47 18 looked at?
11:25:48 19 A No.
11:25:48 20 Q All right. So you don't have an opinion one
11:25:50 21 way or the other as to whether there are or are not
11:25:53 22 dietary sources of acetaldehyde -- acrylonitrile?
11:25:58 23 A It was acrylonitrile.
11:26:00 24 Q Okay. Thanks.
11:26:01 25 A No, I am not.
11:26:02 26 Q Same question with respect to acetaldehyde,
11:26:05 27 do you have an opinion as to whether or not there are
11:26:07 28 dietary sources of acetaldehyde?

11:26:09 1 A No, I do not.
11:26:10 2 Q All right. Now let's move down the list to
11:26:13 3 benzo(a)pyrene.
11:26:15 4 How about if I refer to that as BAP.
11:26:18 5 A Fine with me.
11:26:19 6 Q One of the few ones on this list I know an

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11:26:21 7 abbreviation for.
11:26:22 8 Are there airborne sources of BAP, other than
11:26:27 9 environmental tobacco smoke?
11:26:29 10 A Yes.
11:26:29 11 Q And what might those be?
11:26:31 12 A Any source that has incomplete combustion has
11:26:36 13 the potential to produce -- any carbonaceous fuel that's
11:26:42 14 burned under conditions of incomplete combustion has the
11:26:44 15 potential to produce BAP.
11:26:46 16 Q There's BAP in automobile exhaust?
11:26:48 17 A Yes, there is.
11:26:49 18 Q And in burning wood smoke?
11:26:50 19 A Yes.
11:26:50 20 Q What about dietary sources of BAP, are you
11:26:55 21 familiar with any of those?
11:26:57 22 A A vague recollection of barbecuing and
11:27:05 23 charbroiling, leading to the production of, at least the
11:27:10 24 class of compounds that BAP belongs to.
11:27:13 25 Q Which are the polycyclic aromatic
11:27:16 26 hyrdrocarbons?
11:27:17 27 A That's correct.
11:27:18 28 Q And we can refer to those as PAHs from now

11:27:22 1 on?
11:27:22 2 A Yes.
11:27:26 3 Q Are there -- we've asked that.
11:27:31 4 Is there BAP in the water that we drink?
11:27:37 5 MR. McGUIRE: Calls for speculation.
11:27:38 6 You can answer.
11:27:41 7 THE WITNESS: I don't know for certain, but
11:27:43 8 one could infer that there should be, given that
11:27:47 9 reservoirs and lakes are exposed to the atmosphere and the
11:27:52 10 atmosphere contains BAP. And that BAP will deposit.
11:27:55 11 BY MR. KODSI:
11:27:55 12 Q Next chemical on the list is 1,3-butadiene.
11:28:03 13 Is that an ambient air pollutant?
11:28:05 14 A Yes, it is.
11:28:06 15 Q Are there sources of 1,3-butadiene other than
11:28:10 16 ETS?
11:28:10 17 A Yes.
11:28:10 18 Q And what might those sources be?
11:28:12 19 A Motor vehicle exhaust.
11:28:13 20 Q Wood smoke?
11:28:14 21 A Wood smoke.
11:28:16 22 Q Any combustion of organic material?
11:28:20 23 A Under poor combustion conditions.
11:28:25 24 Q And is -- are there dietary sources of
11:28:30 25 1,3-butadiene?
11:28:33 26 MR. McGUIRE: I wanted to ask you a
11:28:34 27 clarifying question.
11:28:36 28 When you say "dietary sources," are you

11:28:39 1 eliminating absorption of ambient sources? In other
11:28:48 2 words, I'm having a cookie while my cigarette is burning
11:28:52 3 in the ashtray. The ETS particulates fall on the cookie.
11:28:57 4 I eat the cookie.
11:29:01 5 Now, do you want to eliminate -- when you say
11:29:03 6 "dietary sources," are you saying --
11:29:05 7 MR. KODSI: Sure. We can eliminate those.
11:29:08 8 Because I assume the doctor's opinions are not based on
11:29:11 9 absorption of ETS materials resulting in dietary influence
11:29:15 10 of these materials.
11:29:15 11 MR. McGUIRE: That's how you were answering

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11:29:17 12 the question, right?
11:29:18 13 THE WITNESS: That was my understanding of
11:29:19 14 where we were.
11:29:20 15 BY MR. KODSI:
11:29:20 16 Q When we've been talking at this point,
11:29:22 17 Dr. Nazaroff, about dietary sources of exposure to these
11:29:27 18 chemicals, you're inferring dietary sources unrelated to
11:29:32 19 any tobacco influence, right?
11:29:33 20 MR. McGUIRE: It could be any ambient
11:29:35 21 influence. That's what I'm trying to eliminate.
11:29:37 22 In other words, when you say "dietary
11:29:38 23 sources," are you talking about stuff that's in the food
11:29:42 24 independent of what's in the air and falls on the food?
11:29:44 25 MR. KODSI: I think that's a very good
11:29:46 26 clarification, Mickey.
11:29:47 27 BY MR. KODSI:
11:29:47 28 Q Has that been your understanding, Doctor,

11:29:50 1 when we talk about dietary sources of exposure to
11:29:52 2 constituents, we're talking independent of any
11:29:55 3 contamination from the ambient air?
11:29:57 4 A Well, it becomes murky. You know, if for
11:30:03 5 certain species, like metals, airborne deposition may turn
11:30:10 6 out to be the major reason that food contains that
11:30:14 7 compound. And in that case, I can't rule that out.
11:30:19 8 Q All right.
11:30:20 9 A With organic compounds, that's less likely.
11:30:23 10 Q And the compounds, at least up to this point
11:30:27 11 we've talked about, have been organic in nature and not
11:30:29 12 metal?
11:30:30 13 A That's correct.
11:30:30 14 Q Although, we're about to get to a metal one
11:30:33 15 very soon.
11:30:34 16 A That's correct.
11:30:34 17 Q I think we left off with not getting an
11:30:43 18 answer yet to whether there were dietary sources of
11:30:45 19 1,3-butadiene --
11:30:47 20 A Yes.
11:30:48 21 Q -- other --
11:30:50 22 A To my knowledge, there are none.
11:30:52 23 Q Is that something you've studied?
11:30:54 24 A No.
11:30:54 25 Q So I guess when you say, to your knowledge,
11:30:58 26 there are none, that means you're not sure whether there
11:31:01 27 are or aren't?
11:31:02 28 A That is correct. But it's not speculation in

11:31:10 1 the absence of some evidence. Butadiene is a pretty
11:31:13 2 highly volatile, and not stable in the long-term,
11:31:19 3 compound. So there are reasons for me to suspect that
11:31:23 4 dietary sources would not be large.
11:31:25 5 Q Okay. Now we're going down to our first
11:31:32 6 metal on the list, which is cadmium.
11:31:38 7 You agree cadmium is not unique to tobacco
11:31:41 8 smoke, correct?
11:31:42 9 A I think that is correct, yes.
11:31:44 10 Q And individuals are exposed to cadmium from
11:31:49 11 sources other than ETS?
11:31:51 12 A Some individuals are, certainly.
11:31:53 13 Q What would those sources be?
11:31:55 14 A Industrial activities like the manufacturing
11:32:04 15 of rechargable batteries that contain nickel and cadmium.
11:32:15 16 Coal-fired powerplant, because coal contains cadmium as a

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11:32:23 17 trace element.
11:32:27 18 Q Is cadmium an ambient air pollutant?
11:32:37 19 A It's not regulated in the same way as ozone
11:32:43 20 is, for example. Can it be found in the ambient air,
11:32:49 21 yes. In some places.
11:32:50 22 Q Based on your knowledge of cadmium, would you
11:32:54 23 expect to find it in the room that we're in right now?
11:32:57 24 A Not at ordinarily detectable levels, no.
11:33:02 25 Q When you say "not at ordinarily detectable
11:33:09 26 levels," are you talking about levels -- what levels do
11:33:11 27 you have in mind? Are you talking nanograms per cubic
11:33:14 28 meter of air?

11:33:15 1 A Yeah. Let's say nanograms per cubic meter of
11:33:18 2 air. I wouldn't expect cadmium in this air to reach to
11:33:21 3 nanograms per cubic meter.
11:33:23 4 Q Carbon monoxide is the next -- actually, I'm
11:33:31 5 sorry. The dietary sources of Cadmium. Do you have an
11:33:34 6 opinion regarding whether there are dietary sources of
11:33:37 7 exposure to Cadmium?
11:33:38 8 A No. No opinion.
11:33:39 9 Q Okay. The next constituent on your list is
11:33:43 10 carbon monoxide.
11:33:46 11 Is carbon monoxide unique to tobacco smoke?
11:33:49 12 A No.
11:33:50 13 Q Could you give me some examples of sources of
11:33:54 14 exposure to carbon monoxide?
11:33:57 15 A Sure. Motor vehicle exhaust is the primary
11:34:00 16 one. It's in the same category of it's not an organic
11:34:10 17 compound, but it is a product of incomplete combustion. I
11:34:13 18 mentioned that carbon dioxide is the favored form if
11:34:18 19 carbon is burned under favorable conditions. The first
11:34:21 20 thing that gets produced if those conditions are
11:34:23 21 unfavorable is carbon monoxide.
11:34:26 22 Q Do you have an opinion regarding how the
11:34:32 23 concentrations of carbon monoxide attributable to ETS
11:34:37 24 compare with concentrations of carbon monoxide
11:34:40 25 attributable to other sources?
11:34:42 26 A Concentrations in which environments?
11:34:44 27 Q Residential environments.
11:34:47 28 A Indoors?

11:34:48 1 Q Indoors.
11:34:49 2 A On the whole, I expect motor vehicles to be a
11:34:58 3 more important source and -- then cigarettes.
11:35:06 4 Q Okay. And is there carbon monoxide -- are
11:35:10 5 there dietary sources of exposure to carbon monoxide?
11:35:15 6 A For the same reasons as butadiene, I suspect
11:35:20 7 not or not significantly.
11:35:22 8 Q But it's not something that you studied?
11:35:25 9 A That's correct.
11:35:25 10 Q The next constituent on the list is
11:35:28 11 formaldehyde.
11:35:29 12 Is formaldehyde unique to tobacco smoke?
11:35:31 13 A No.
11:35:31 14 Q And what are other sources of exposure to
11:35:34 15 formaldehyde?
11:35:35 16 A Again, it's an incomplete combustion
11:35:39 17 byproduct. It belongs to the same as acetaldehyde. So
11:35:43 18 any process that produces acetaldehyde in combustion is
11:35:48 19 also likely to produce formaldehyde.
11:35:50 20 In addition, formaldehyde is a widely used
11:35:55 21 industrial feedstock chemical that ends up appearing in

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11:36:01 22 adhesive and many other products that we use in
11:36:04 23 buildings. So it can be emitted directly from those
11:36:08 24 materials.
11:36:08 25 Q What might be sources of exposure to
11:36:12 26 formaldehyde in residential environments?
11:36:15 27 A Plywood, particle board, tobacco smoke.
11:36:21 28 Q Carpeting?

11:36:24 1 A Possibly, yeah.
11:36:25 2 Q Do you have an opinion as to how the levels
11:36:29 3 of formaldehyde attributable to ETS in a residential
11:36:34 4 setting compare with the levels of formaldehyde
11:36:37 5 attributable to those other sources?
11:36:39 6 MR. McGUIRE: Incomplete hypothetical.
11:36:40 7 How old is the carpet? How old is the
11:36:43 8 plywood? How recent are the cigarettes? How many people
11:36:46 9 smoked the cigarettes?
11:36:47 10 MR. KODSI: If the doctor needs to use that
11:36:49 11 in his answer, that's fine.
11:36:51 12 THE WITNESS: There are circumstances in
11:36:55 13 which cigarettes could be the dominant source.
11:36:57 14 BY MR. KODSI:
11:36:57 15 Q Could you give me examples of those.
11:36:59 16 A The bingo parlor in Las Vegas.
11:37:03 17 Q Yeah. Well, I -- and I may not have said
11:37:06 18 it, but I thought I said restricting it to residential.
11:37:10 19 A Restricting it to a residential environment?
11:37:13 20 Q Yeah.
11:37:14 21 A A residential environment that hasn't been
11:37:17 22 refurnished in ten years that has a -- that's not in an
11:37:21 23 urban area and that has two smokers who smoke heavily
11:37:27 24 indoors.
11:37:29 25 VIDEOGRAPHER: Excuse me, Counsel. I need to
11:37:32 26 do a tape change in about two minutes.
11:37:34 27 MR. KODSI: Okay. Let me follow up on that
11:37:36 28 line, and then we'll stop for the tape change.

11:37:38 1 BY MR. KODSI:
11:37:38 2 Q And that is an example by which you -- all
11:37:41 3 those factors would have to take place for your opinion to
11:37:44 4 be that the formaldehyde levels from ETS were higher than
11:37:48 5 the ambient formaldehyde levels in that residence?
11:37:51 6 A No. That's not precisely what I said. I
11:37:54 7 said that's an example where the environmental tobacco
11:37:58 8 smoke contribution would dominate.
11:38:01 9 Q Are you aware of studies that have looked at
11:38:03 10 that issue?
11:38:04 11 A No.
11:38:05 12 Q Are you aware of any study that has measured
11:38:08 13 formaldehyde in a residential environment attributable to
11:38:12 14 environmental tobacco smoke?
11:38:14 15 A I can't recall at the moment.
11:38:16 16 MR. KODSI: Okay. We can do a tape change.
11:38:19 17 VIDEOGRAPHER: We are off the record. The
11:38:22 18 time is 11:37, and this concludes Tape 1.
11:38:25 19 (Recess.)
11:57:52 20 VIDEOGRAPHER: We are back on the record.
11:57:58 21 This begins Tape 2 of the Volume III deposition of William
11:58:03 22 Nazaroff, and the time is 11:57.
11:58:06 23 MR. KODSI: Mickey, what do you need?
11:58:13 24 MR. McGUIRE: I'm sorry. I don't know what I
11:58:14 25 did with my glasses.
11:58:16 26 Sorry.

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11:58:40 27 MR. KODSI: No problem.
11:58:41 28 BY MR. KODSI:

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11:58:41 1 Q Dr. Nazaroff, we were going through
11:58:44 2 Exhibit 559, the constituents that you were testifying
11:58:49 3 about. And I think we had just finished with
11:58:51 4 formaldehyde.
11:58:53 5 And we've already talked about nicotine and
11:58:55 6 the two nitrosamines that are listed on that table. So
11:58:59 7 I'm not going to ask you any more questions about those.
11:59:06 8 The next constituent you list on Table 1D is
11:59:09 9 tobacco smoke (RSP).
11:59:10 10 What is that?
11:59:12 11 A RSP stands for respirable suspended
11:59:21 12 particulate matter.
11:59:23 13 Q And -- I'm sorry. Did I interrupt?
11:59:25 14 A It's okay.
11:59:26 15 Q Is there something you wanted to say?
11:59:28 16 I think you talked about RSP in detail in
11:59:31 17 your first two days of deposition. So I don't know that I
11:59:34 18 want to revisit that just that you recognize that RSP is
11:59:37 19 also not unique to ETS.
11:59:41 20 A That's correct.
11:59:43 21 Q The last one, the chemical on this table is
11:59:49 22 toluene.
11:59:50 23 What is toluene?
11:59:50 24 A Toluene is an aromatic compound. It's a
11:59:57 25 similar structure as benzene. It has a single ring, but
12:00:00 26 it has a methyl group in place of one of the hydrogens.
12:00:04 27 Q Are there sources of ambient exposure to
12:00:08 28 toluene other than environmental tobacco smoke?

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12:00:10 1 A Yes.
12:00:10 2 Q And what would those be?
12:00:12 3 A Toluene is used as a fuel. It's like benzene
12:00:16 4 mixed in with motor vehicle fuel. So fuel evaporation
12:00:22 5 would constitute a source. It's also a generally used
12:00:26 6 industrial chemical. So it appears as a solvent in some
12:00:30 7 materials, like adhesives that would be used indoors.
12:00:34 8 Q Are there dietary sources of exposure to
12:00:40 9 toluene as well?
12:00:42 10 A None to my knowledge.
12:00:43 11 Q All right.
12:00:43 12 There's that.
12:00:56 13 MR. KODSI: Okay. Mickey, at this point, to
12:01:07 14 try to get things to move along a little better, I did not
12:01:12 15 get the document that you faxed to Pat until today. And
12:01:15 16 Pat had a chance to look at it over the weekend, which
12:01:18 17 is -- really, my understanding is Exhibit 559 is the crux
12:01:23 18 of the doctor's opinions.
12:01:24 19 MR. McGUIRE: The crux of his more recent
12:01:26 20 work.
12:01:26 21 MR. KODSI: More recent work.
12:01:28 22 Rather than me trying to go through it -- and
12:01:31 23 I've got some follow-ups, I think. But if it's okay with
12:01:35 24 you, I'd like to pass to Pat to go through that and some
12:01:38 25 of the documents. And, hopefully, I won't have a lot more
12:01:42 26 to do after that.
12:01:42 27 MR. McGUIRE: I don't think I have any basis
12:01:44 28 upon which I could make any meaningful objection. So go

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12:01:47 1 right ahead.
12:01:48 2 MR. KODSI: Okay. So I think that's probably

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12:01:50 3 the easiest way to proceed.
12:02:06 4
12:02:06 5 EXAMINATION
12:02:07 6 BY MR. CAFFERTY:
12:02:07 7 Q Dr. Nazaroff, good afternoon. My name is Pat
12:02:11 8 Cafferty. I represent Philip Morris. You and I met about
12:02:15 9 a year ago --
12:02:15 10 A I recall that.
12:02:16 11 Q -- in my office up in San Francisco. I'm
12:02:18 12 sorry. I got in a little bit later this morning, so I
12:02:21 13 didn't get a chance to say good morning to you.
12:02:24 14 What I'd like to do first is just clarify a
12:02:27 15 couple points that Mr. Kodsi was just asking you about.
12:02:31 16 First, he asked you whether or not you
12:02:32 17 considered yourself to be a risk assessment expert, and I
12:02:35 18 believe you said that you understand the field reasonably
12:02:37 19 well.
12:02:38 20 Since your deposition last August, have you
12:02:41 21 done any work in the risk assessment field?
12:02:44 22 A In exposure assessment as a component of risk
12:02:50 23 assessment, yes.
12:02:51 24 Q And what exposure assessments have you done
12:02:54 25 in the last year?
12:02:56 26 A Well, it's not a specific exposure
12:03:00 27 assessment, except as exhibited here in -- or shown here
12:03:05 28 in Exhibit 559. But, rather, some research that I've

12:03:14 1 conducted, supervised in my group with respect to how one
12:03:21 2 might carry out an exposure assessment more efficiently.
12:03:27 3 We've developed an idea called the inhalation
12:03:31 4 transfer factor. Probably the early work predates my last
12:03:37 5 deposition, but I don't recall kind of where that work
12:03:41 6 was. It's now reached a stage of completion.
12:03:43 7 Q Okay. Is that methodology -- is
12:03:47 8 "methodology" the right term to use for that?
12:03:49 9 A That's reasonable, yes.
12:03:50 10 Q Is that methodology, a methodology that's
12:03:54 11 specifically applicable to certain kinds of exposure, or
12:03:57 12 is it generally applicable?
12:03:58 13 A It's generally applicable to airborne
12:04:01 14 exposures.
12:04:01 15 Q And what -- what is the inhalation transfer
12:04:04 16 factor methodology, if I can use that term?
12:04:09 17 A The idea is aimed at preliminary or
12:04:16 18 approximate exposure assessments, and it -- the goal is to
12:04:24 19 do a lot of the detailed calculations once for
12:04:32 20 representative situations and then provide tables that one
12:04:36 21 would use to look up transfer factor values.
12:04:39 22 The transfer factor itself is defined as the
12:04:44 23 mass of a pollutant inhaled per unit mass emitted. And so
12:04:51 24 that transfer factor would be -- have values that are
12:04:57 25 specific to the circumstances in which emissions occur.
12:05:01 26 It's aimed at trying to add some clarity to and simplicity
12:05:08 27 to preliminary risk assessment evaluations.
12:05:10 28 Q Is the inhalation transfer factor

12:05:14 1 methodology something that could be applied to ETS?
12:05:16 2 A Yes.
12:05:17 3 Q Have you applied it to ETS?
12:05:20 4 A Yes. In -- in -- not to all components of
12:05:30 5 ETS, but to the particulate matter.
12:05:32 6 Q Have you done it in forming your opinions in
12:05:34 7 this case?

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12:05:36 8 A It was not a part of the work that I did to
12:05:41 9 develop the declaration or this addendum.
12:05:45 10 Q Okay. How did you apply the inhalation
12:05:49 11 transfer factor methodology to ETS?
12:05:57 12 A Applying -- well, applying is okay, I
12:05:59 13 suppose. It's -- I've carried out some calculations of
12:06:07 14 the exposure of Californians to particulate matter using
12:06:14 15 the inhalation transfer factor idea. And the two sources
12:06:19 16 of particulate matter I considered were environmental
12:06:22 17 tobacco smoke or tobacco particles and diesel particles,
12:06:28 18 diesel soot particles.
12:06:30 19 Q What was the context in which you performed
12:06:33 20 this work?
12:06:34 21 A The International Society for Exposure
12:06:39 22 Analysis is holding its annual meeting this fall in
12:06:43 23 Monterey, and I was contacted several months ago by one
12:06:50 24 the organizers of the conference, who was aware of my work
12:06:54 25 on the inhalation transfer factor, and asked whether I
12:06:57 26 would prepare a and submit an abstract for presentation at
12:07:02 27 that meeting. And I agreed, and this is what I chose to
12:07:07 28 do.

12:07:08 1 Q Mr. McGuire provided me with a big stack of
12:07:10 2 documents that I received on Friday at my office. I
12:07:13 3 didn't notice an abstract regarding that work, in the
12:07:18 4 materials that I received.
12:07:19 5 Did you provide such an abstract to
12:07:21 6 Mr. McGuire?
12:07:22 7 A No, I don't believe I did.
12:07:23 8 Q Is that a publicly available document, that
12:07:26 9 abstract?
12:07:27 10 A I guess I don't know when an abstract
12:07:33 11 submitted to a conference becomes publicly available. So
12:07:37 12 I don't know.
12:07:38 13 Q Is it something we could get a copy of from
12:07:41 14 you?
12:07:42 15 A I have a copy, but not in my possession with
12:07:46 16 me in San Diego.
12:07:47 17 MR. McGUIRE: Is it something that you want,
12:07:51 18 I mean, even though he's testified that he has not used it
12:07:54 19 or relied on it?
12:07:55 20 MR. CAFFERTY: Sure. I'd like to see how it
12:07:58 21 works.
12:07:58 22 Is that something we might be able to get a
12:08:00 23 copy of?
12:08:02 24 MR. McGUIRE: I think so. I'll try.
12:08:03 25 MR. CAFFERTY: Okay. Thank you.
12:08:04 26 BY MR. CAFFERTY:
12:08:04 27 Q And what were the results of applying the
12:08:09 28 inhalation transfer factor methodology to ETS?

12:08:12 1 A In the context of the specific abstract,
12:08:19 2 which was the case that I've looked at, I concluded that
12:08:22 3 the exposure or the inhalation -- the present dose of
12:08:30 4 particulate matter for Californians in cumulative, in
12:08:38 5 total, for the whole population, was similar for
12:08:43 6 environmental tobacco smoke particles and for diesel soot
12:08:47 7 emissions from motor vehicles.
12:08:55 8 Q How did the levels that you calculated, using
12:09:00 9 the inhalation transfer factor for particulate -- and when
12:09:03 10 you say "particulate matter," do you mean RSP --
12:09:06 11 A Yes.
12:09:06 12 Q -- or do you mean something else?

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12:09:08 13 A No. RSP.
12:09:09 14 Q How did the levels of RSP that you calculated
12:09:12 15 using your inhalation transfer factor methodology compare
12:09:16 16 to the levels of RSP that appeared in your declaration
12:09:19 17 that was filed in this case and in the supplemental
12:09:21 18 materials that we're talking about today, in Exhibit 559?
12:09:25 19 A The calculations use different metrics, and
12:09:28 20 I didn't make such a comparison.
12:09:30 21 Q Do you know whether the numbers are greater,
12:09:32 22 or lower for the inhalation transfer factor than they
12:09:36 23 would be for the calculations that you performed for this
12:09:39 24 case?
12:09:39 25 A I don't know.
12:09:40 26 Q Now, other than the -- this inhalation
12:09:51 27 transfer factor exposure assessment work that you did in
12:09:54 28 the last year, have you done any other exposure

12:09:56 1 assessments in the last year since we took your
12:10:00 2 deposition? And when I say "last year," it's really about
12:10:03 3 ten and a half months.
12:10:04 4 A I don't believe so, no.
12:10:06 5 Q Okay. Have you done any risk assessments,
12:10:09 6 performed any risk assessments during that time frame?
12:10:14 7 A Actually, I'd like to revisit the previous
12:10:19 8 question that you asked me, because, now, as we talk about
12:10:21 9 this, I didn't have clear in my mind something I did do
12:10:25 10 related to an exposure assessment in this period.
12:10:28 11 I was asked by an agency within Cal EPA to
12:10:38 12 take a look at proposed regulations for methyl bromide and
12:10:44 13 soil fumigation and to provide them with a peer review of
12:10:49 14 the proposed regulations and the documents that fed into
12:10:53 15 that. And my efforts in that area focused on the exposure
12:10:56 16 assessment aspects.
12:10:58 17 Q And which agency did you work for in that?
12:11:01 18 A That was the DPR, I guess, Department of
12:11:04 19 Pesticide Regulation, within Cal EPA.
12:11:06 20 Q Okay.
12:11:07 21 A I believe it's within Cal EPA.
12:11:09 22 Q What types of exposures were you evaluating?
12:11:12 23 A Inhalation exposure to workers and to people
12:11:17 24 who live near farms where methyl bromide would be applied.
12:11:21 25 Q How is methyl bromide applied? Is it applied
12:11:24 26 as a gas, as a liquid, or as a solid?
12:11:27 27 A It's applied as a gas.
12:11:29 28 Q And what conclusions did you reach as a

12:11:31 1 result of your exposure assessment?
12:11:33 2 A That the circumstances that they used to set
12:11:36 3 the protective measures didn't consider a broad enough
12:11:44 4 range of meteorologic conditions to be protective under
12:11:48 5 all circumstances.
12:11:49 6 Q Did you prepare a report summarizing your
12:11:51 7 conclusions?
12:11:52 8 A I prepared a peer review that I sent to the
12:11:55 9 state, yes.
12:11:55 10 Q And who was that -- that was submitted to
12:11:57 11 DPR?
12:11:58 12 A Yes.
12:11:58 13 Q Okay. Is that something that also is a
12:12:01 14 publicly available document?
12:12:02 15 A I believe, because it was submitted in an
12:12:07 16 open state process, that that is formally publicly
12:12:10 17 available, yes.

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12:12:11 18 Q Is that something that we could get a copy of
12:12:14 19 from you as well?
12:12:15 20 A Again, I possess a copy, but not with me here
12:12:18 21 in San Diego. So it has the same -- I mean, it's not
12:12:21 22 complicated for me to arrange a copy if I'm sitting in my
12:12:24 23 office in Oakland or in Berkeley. But it's a lot more
12:12:28 24 difficult to arrange from here.
12:12:29 25 Q Right. Okay.
12:12:31 26 Now, Mr. Kodsi asked you some questions about
12:12:34 27 your opinions, and I just wanted to be clear on a couple
12:12:39 28 of the opinions that you expressed. One of them was that

12:12:42 1 you were going to express an opinion regarding the
12:12:44 2 significance of ETS exposures with respect to possible
12:12:47 3 health outcomes.
12:12:48 4 Did I get that correct?
12:12:49 5 A That's -- that's, I believe, a correct
12:12:54 6 summary of what I said, yes.
12:12:55 7 Q Okay. And what is the opinion that you're
12:12:57 8 going to express regarding the significance of ETS
12:13:00 9 exposures with respect to possible health outcomes?
12:13:03 10 A There are two elements of it. One is that
12:13:09 11 there are constituents -- and I should begin this answer
12:13:14 12 by qualifying my previous answer, which is I will make
12:13:19 13 this opinion by comparison with other exposures.
12:13:26 14 So one is an opinion which is -- the support
12:13:32 15 of which is laid out in Exhibit 559, that for some
12:13:38 16 constituents, nonsmokers who are exposed to higher than
12:13:45 17 average levels of environmental tobacco smoke have
12:13:52 18 exposures to these constituents that may approach 10, 20,
12:13:58 19 or 30 percent of the exposure of an average smoker through
12:14:02 20 mainstream smoke.
12:14:03 21 The second point is that the -- if the
12:14:12 22 exposures associated with environmental tobacco smoke were
12:14:19 23 a consequence of an industrial activity that required a
12:14:22 24 permit from an air quality regulatory agency in
12:14:26 25 California, the exposures are sufficiently high so that
12:14:30 26 that activity would not be permitted.
12:14:32 27 Q Are there any other aspects of your opinion?
12:14:41 28 A No.

12:14:42 1 Q Okay. Well, let's talk first about the
12:14:45 2 comparison with the other exposures. You mentioned what
12:14:51 3 I'll term active smoking.
12:14:53 4 Is that a term you're familiar with?
12:14:55 5 A Yes.
12:14:55 6 Q All right. Do you understand what I mean by
12:14:56 7 "active smoking"? Is somebody actually smoking a
12:15:00 8 cigarette and the exposure that that person gets to
12:15:03 9 tobacco smoke?
12:15:04 10 A Yes.
12:15:04 11 Q Okay. Are there any other exposures that you
12:15:07 12 intend to compare ETS to?
12:15:10 13 A Other than the two that I've just mentioned,
12:15:15 14 no.
12:15:15 15 Q Okay. Now, the industrial activity requiring
12:15:20 16 a permit, what is the basis for your opinion that ETS
12:15:26 17 exposures, if they were industrial activities, would not
12:15:30 18 be permitted?
12:15:36 19 A In practice now in the state of California,
12:15:38 20 it's required before -- as a part of the process to
12:15:47 21 operate an industrial process or activity or to modify it,
12:15:50 22 one is required to have a permit with respect to

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environmental releases of contaminants. And the process of permitting requires a health risk assessment or a health risk evaluation associated with releases to air, water, and roots of exposure that the public might encounter.

The -- for toxic air contaminants or

hazardous air pollutants, the state has some bright line values for the acceptable level of risk based on the maximally exposed individual. And environmental tobacco smoke exposure, according to my calculations, would exceed those bright line requirements.

Q Okay. How many permits have you applied for?

A None.

Q How many times have you advised people applying for permits?

A Never.

Q How many health risks -- risk assessments have you ever performed?

First of all, let me ask you another question.

What did you mean by the term "health risk assessment"?

A Risk assessment with respect to an adverse health outcome.

Q Did you mean by that term, a regulatory health risk assessment?

A That's what I had in mind.

Q Okay. How many regulatory health risk assessments have you performed?

A As that question is posed, I'm not sure I can answer it. That is -- and I should, I guess, explain why.

I do calculations as components of health risk assessments as part of -- and I even teach to this in my air quality engineering classes, for example. But I've

never done that for an industrial client.

Q Okay. So would the answer be that you haven't done any regulatory health risk assessments?

A I have not done any that have been submitted to the state.

Q Have you done any that haven't been submitted to the state?

A Well, yes. As a part of classroom exercises, teaching or problems.

Q Now, when you talked about activities that required permits, what types of permits were you talking about?

MR. McGUIRE: That was asked and answered.

Go ahead again.

THE WITNESS: Operating permit.

BY MR. CAFFERTY:

Q What types of operating permits?

A I have nothing I guess more to add than that.

Q Were you talking about air emission permits issued by the air districts of the state of California?

A Yes.

Q Were you talking about water discharge permits issued by the Regional Water Quality Control Boards in the state of California?

A No.

Q Were you talking about --

A Only because I'm only concerned with the air

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12:19:00 28 pathway of exposure here. I mean, those sorts of permits

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12:19:04 1 are required, as to my understanding.
12:19:06 2 Q Okay. Was the only kind of permit you were
12:19:08 3 talking about, the air permits that are issued by Air
12:19:12 4 Pollution Control Districts in California?
12:19:14 5 A Yes.
12:19:14 6 Q All right. What are the standards for
12:19:17 7 issuing air pollution permits in the state of California?
12:19:20 8 A I'm not sure what you mean by that question.
12:19:23 9 Q Well, what are the -- what are the
12:19:25 10 risk-related standards for issuing air permits in the
12:19:28 11 state of California?
12:19:29 12 A The thresholds, the bright line values? Is
12:19:32 13 that --
12:19:32 14 Q We'll get to the bright line values in a
12:19:35 15 minute. I just want to know generally what the standards
12:19:38 16 are for issuing air permits in California.
12:19:40 17 A The issue varies or the circumstances vary,
12:19:44 18 according to what type of pollutant is emitted, whether
12:19:52 19 it's something that's listed under the toxic air
12:19:54 20 contaminants or hazardous air pollutants list or something
12:19:58 21 that would contribute to photo chemical smog or different
12:20:02 22 regulatory requirements.
12:20:04 23 Q Let's talk about things that are listed under
12:20:06 24 the -- as a toxic air contaminant.
12:20:08 25 Are you familiar with the Health and Safety
12:20:10 26 Code requirements regarding toxic air contaminants?
12:20:16 27 A Familiar, generally, yes.
12:20:17 28 Q Have you ever read the statute that sets

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12:20:19 1 forth those requirements?
12:20:20 2 A I don't recall.
12:20:20 3 Q Have you ever read the California Air
12:20:23 4 Resources Board regulations that set forth regulations
12:20:26 5 implementing the statutory requirements?
12:20:29 6 A No.
12:20:30 7 MR. McGUIRE: Let's assume facts -- just a
12:20:32 8 second before you answer.
12:20:33 9 This assumes facts not in evidence. There is
12:20:35 10 no evidence at all that what Mr. Cafferty said is, in
12:20:39 11 fact, true.
12:20:39 12 BY MR. CAFFERTY:
12:20:39 13 Q You may answer.
12:20:41 14 A I said no.
12:20:42 15 Q Have you ever reviewed the toxic air
12:20:46 16 contaminant regulations for any air district in the state
12:20:48 17 of California?
12:20:49 18 A No.
12:20:49 19 MR. McGUIRE: Again, assumes facts not in
12:20:51 20 evidence that there are such regulations.
12:20:53 21 BY MR. CAFFERTY:
12:20:53 22 Q All right. Well, you mentioned before bright
12:21:00 23 line values.
12:21:01 24 What did you mean by "bright line values"?
12:21:03 25 A Guidelines for levels of risk that would be
12:21:08 26 considered acceptable or conditionally acceptable.
12:21:12 27 Q Okay. And where are those bright line values
12:21:15 28 set forth?

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12:21:16 1 A I've seen them in a report to the State of
12:21:25 2 California from the Risk Assessment Advisory Committee.
12:21:29 3 Q Okay. What is the title of that report?

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12:21:34 4 A I don't recall.
12:21:38 5 Q Do you know when it was published?
12:21:42 6 A I can give you a pointer to the report, I
12:21:47 7 believe. It appears in my C.V., because I was on that
12:21:51 8 committee.
12:21:51 9 Q Okay. I think that we marked your C.V. last
12:21:54 10 year. We probably have that in this stack of stuff
12:21:58 11 somewhere.
12:21:59 12 MR. McGUIRE: I 'E'-mailed you a more recent
12:22:06 13 one.
12:22:07 14 THE WITNESS: You know, there's one other
12:22:08 15 document where we could probably find it, and that is in
12:22:11 16 my original declaration in the prefatory remarks or the
12:22:16 17 earlier remarks.
12:22:17 18 BY MR. CAFFERTY:
12:22:17 19 Q Okay. Let me show you that. That's
12:22:21 20 Exhibit 27 from your first deposition.
12:22:25 21 A While I find the place where it's discussed,
12:22:53 22 but I do not find here the title of the report.
12:22:55 23 Q Would it be in your list of references to
12:22:57 24 your declaration that would be at the end of the
12:23:00 25 declaration?
12:23:17 26 A It does not appear to be there.
12:23:20 27 Q Perhaps we could take a look at your updated
12:23:29 28 C.V., and you might find it in there.

12:23:31 1 MR. CAFFERTY: Is that something you have
12:23:33 2 available, Mickey?
12:23:34 3 MR. McGUIRE: Yeah. That is PX-WWN-1392
12:23:40 4 through 1409.
12:23:53 5 THE WITNESS: The citation appears on page 17
12:23:57 6 of this document, which is PX-WWN-001408. It's Item No.
12:24:04 7 11 at the bottom of that page.
12:24:05 8 BY MR. CAFFERTY:
12:24:05 9 Q Okay. And what is the title of the report?
12:24:08 10 A "A Review of the California Environmental
12:24:10 11 Protection Agency's Risk Assessment Practices, Policies
12:24:15 12 and Guidelines."
12:24:16 13 Q Okay. And is that the report in which you
12:24:20 14 saw the bright line values that you mentioned before?
12:24:22 15 A Yes.
12:24:22 16 Q What is the regulatory significance of that
12:24:26 17 report?
12:24:27 18 MR. McGUIRE: No foundation.
12:24:29 19 What do you mean? That sounds like a legal
12:24:32 20 question as to what the regulatory significance is.
12:24:35 21 Answer if you understand what he's talking
12:24:37 22 about.
12:24:38 23 THE WITNESS: I don't know how to answer your
12:24:42 24 question.
12:24:43 25 BY MR. CAFFERTY:
12:24:43 26 Q Okay. Do you know whether the Review of the
12:24:54 27 California Environmental Protection Agency's Risk
12:24:57 28 Assessment Practices, Policies and Guidelines document

12:25:00 1 that you just identified contains binding legal
12:25:04 2 requirements for air permits?
12:25:12 3 A No, I don't know that.
12:25:13 4 Q Is there any other place where you have seen
12:25:16 5 these bright line values that you testified about?
12:25:20 6 A No.
12:25:20 7 Q Okay. Where in the document that you're
12:25:25 8 talking about are those bright line values?

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12:25:28 A They appear in a table in an appendix. I
12:25:33 can't specify it any more than that without the document.
12:25:35 Q Okay. Is that document included in the files
12:25:39 that you provided to Mr. McGuire to provide to me?
12:25:43 A No, it's not.
12:25:46 MR. McGUIRE: It is listed as part of his
12:25:51 C.V. which was provided to you. And, therefore, it is.
12:25:55 MR. CAFFERTY: That's helpful, Mickey, to
12:26:02 note that. A copy of it is not contained in the documents
12:26:05 that were provided to us.
12:26:07 BY MR. CAFFERTY:
12:26:07 Q Now, what specific bright line values --
12:26:10 MR. McGUIRE: I just want to clarify.
12:26:12 We had no obligation to provide you with
12:26:15 published documents -- publicly available documents. So
12:26:20 it's not surprising that it wasn't there.
12:26:21 MR. CAFFERTY: I'm not going to debate what
12:26:24 you had an obligation to do and what you didn't have an
12:26:27 obligation to do. There was a subpoena that defines what
12:26:29 it was, and I'm not going to argue with you about it right

12:26:33 now. That's for sure.
12:26:34 BY MR. CAFFERTY:
12:26:34 Q But what I want to know is what are the
12:26:38 specific bright line values that will serve as the basis
12:26:41 for your opinion that ETS emissions, if they came from an
12:26:47 industrial activity, couldn't be permitted?
12:26:50 A ETS exposures would exceed the levels that a
12:26:56 permit would be allowed or granted.
12:27:00 Q Okay.
12:27:02 A The specific values pertain to carcinogens,
12:27:12 and the highest bright line value is ten to the minus
12:27:17 fourth or one in 10,000. If a cancer risk exceeds that
12:27:23 for the maximally exposed individual, the guidelines
12:27:28 suggest that a permit not be granted.
12:27:30 Q Okay. Are the bright line values that you're
12:27:38 relying on specific for compounds, or are they a general
12:27:43 ten to the minus four risk level?
12:27:50 A They are specific for carcinogens. They may
12:27:54 also require that the carcinogen appear on the list of
12:27:59 regulated hazardous air pollutants or toxic air
12:28:02 contaminants.
12:28:04 That list is maintained by Cal EPA, and its
12:28:11 genesis begins with the federal regulations under the
12:28:15 Clean Air Act amendments of 1990.
12:28:17 Q Maybe I should ask it another way.
12:28:20 Is the only bright line value that you're
12:28:22 relying on for your opinion, that ten to minus four
12:28:28 general cancer risk?

12:28:31 A The -- there are three entries in that table
12:28:36 that contribute to my opinion. That ten to the minus four
12:28:43 is the critical one.
12:28:44 Q What are the other entries that contribute
12:28:47 to your opinion?
12:28:48 A There are entries at ten to the minus fifth
12:28:51 and ten to the minus sixth. Ten to the minus six is
12:28:56 considered a diminimus level below which no further
12:28:59 regulatory requirements be required for permitting.
12:29:05 Q What about ten to the minus five?
12:29:08 A Ten to the minus five is -- and this, I don't
12:29:14 remember precisely. But it's in the zone where there is
12:29:19 some flexibility in permitting, possibly requiring best

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12:29:23 14 available control technology, for example, to be
12:29:25 15 implemented.
12:29:26 16 Q Just to remind me, you consider there to be a
12:29:33 17 difference between an exposure assessment and a risk
12:29:38 18 assessment, correct?
12:29:38 19 A Yes.
12:29:39 20 Q Okay. And in this case, you performed an --
12:29:42 21 let me just -- what generally is the difference between an
12:29:45 22 exposure assessment and a risk assessment?
12:29:48 23 A An exposure assessment is a component of a
12:29:52 24 risk assessment that quantifies the -- often the specific
12:30:00 25 constituents. And the amounts or quantity of exposure for
12:30:07 26 populations who are exposed.
12:30:09 27 Q And in this instance, you performed an
12:30:13 28 exposure assessment but not a risk assessment, correct?

12:30:17 1 A Exposure assessment was the central thrust of
12:30:21 2 my work. In the context of this one opinion -- and, in
12:30:26 3 fact, even -- in the original declaration, because I'm
12:30:32 4 making comparisons with Prop 65 bright line values, there
12:30:39 5 is implicit a risk assessment.
12:30:41 6 Whether one says the bright line value is a
12:30:44 7 certain level of exposure that's allowed or whether one
12:30:49 8 takes the exposure that's calculated and converts that to
12:30:53 9 a risk and then compares the risk with the acceptable
12:30:57 10 risk, it is really a minor and perhaps academic difference.
12:31:01 11 Q Well, let's talk -- let's focus on your
12:31:04 12 opinion here regarding industrial activity requiring a
12:31:09 13 permit.
12:31:10 14 I want to focus on that, because, as I
12:31:13 15 understood you, there aren't any specific bright line
12:31:17 16 values for specific chemicals that you're relying on; is
12:31:20 17 that correct?
12:31:20 18 A That's -- for that opinion, yes. Yes, that's
12:31:24 19 correct.
12:31:24 20 Q So in order to come up with a number to
12:31:27 21 compare against the bright line value of ten to the minus
12:31:30 22 four, ten to the minus five, or ten to the minus six,
12:31:34 23 someone would have to do a risk assessment to determine
12:31:37 24 whether or not the ETS exposures were above those levels;
12:31:40 25 is that correct?
12:31:40 26 A The -- you may wish to put a name on this and
12:31:45 27 call it a risk assessment. The fact or the reality is all
12:31:50 28 it requires is multiplying exposure times a risk factor or

12:31:56 1 a unit risk factor. That's a multiplication that doesn't
12:32:01 2 require a very high level of expertise. And with that,
12:32:06 3 you can make a risk estimate.
12:32:07 4 Q Okay. What are the specific chemical
12:32:10 5 compounds in ETS -- or from ETS exposures --
12:32:17 6 MR. McGUIRE: I just had a thought.
12:32:19 7 MR. KODSI: Actually, I think the Russians
12:32:22 8 have brought back Mr. McGuire's computer.
12:32:24 9 MR. McGUIRE: Maria.
12:32:32 10 BY MR. CAFFERTY:
12:32:32 11 Q Let me start again with the question,
12:32:36 12 Dr. Nazaroff.
12:32:43 13 What specific chemicals in an ETS exposure
12:32:48 14 scenario would be above the ten to the minus four, ten to
12:32:52 15 the minus five, or ten to the minus six levels, in your
12:32:59 16 opinion?
12:32:59 17 A That's a compound question that makes a
12:33:02 18 direct answer very difficult.

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12:33:04 19 Q How can I break that down to make it easier
12:33:07 20 for you?
12:33:07 21 A Why three different bright line values?
12:33:11 22 Q Well, let's take them one at a time. We'll
12:33:14 23 make it a little easier for you.
12:33:16 24 What chemical compounds in an ETS exposure
12:33:18 25 scenario would be above the ten to the minus four risk
12:33:22 26 level?
12:33:23 27 A Butadiene.
12:33:24 28 Q Butadiene. Okay.

12:33:25 1 And how did you determine -- strike that.
12:33:28 2 What is the basis for your opinion that
12:33:31 3 butadiene contained in an ETS exposure scenario would
12:33:36 4 present a risk greater than ten to the minus four?
12:33:40 5 A The calculation in my original declaration
12:33:51 6 made a comparison between butadiene and the Prop 65 bright
12:33:59 7 line value, or no significant risk level for butadiene.
12:34:03 8 And that comparison indicated to me that
12:34:11 9 there are Californians who are exposed well in excess of
12:34:15 10 ten times the NSRL under Prop 65. The NSRL under Prop 65
12:34:23 11 is set at a risk level of ten to the minus five.
12:34:26 12 Therefore, if exposure occurs at ten times that level, the
12:34:30 13 associated risk would be ten to the minus four.
12:34:32 14 Q Okay. Would it be fair to say that if the
12:34:41 15 Prop 65 number for butadiene is wrong, then your opinion
12:34:48 16 would be wrong?
12:34:50 17 A No. That's a -- there is a leap of logic
12:34:53 18 there that doesn't follow.
12:34:55 19 Q All right. What opinion do you have, if any,
12:35:06 20 about the validity of the Prop 65 no significant risk
12:35:10 21 level for butadiene?
12:35:11 22 A I have none.
12:35:13 23 Q Do you have any expertise to determine
12:35:15 24 whether that's a valid number or an invalid number?
12:35:17 25 MR. McGUIRE: Calls for a legal conclusion as
12:35:19 26 to the term "expertise."
12:35:22 27 THE WITNESS: I have adequate expertise to
12:35:27 28 read the literature related to health risk numbers and

12:35:38 1 discern whether the scientific community is in general
12:35:45 2 agreement or not.
12:35:46 3 BY MR. CAFFERTY:
12:35:46 4 Q Have you read all of the scientific
12:35:49 5 literature for butadiene?
12:35:51 6 A No.
12:35:51 7 Q Have you read any of it?
12:35:54 8 A Yes.
12:35:55 9 Q What portion did you read?
12:35:57 10 A I can't cite the specific material, sitting
12:36:02 11 here.
12:36:03 12 Q How did you do your research to identify the
12:36:08 13 butadiene literature that you read?
12:36:12 14 A I didn't do it in the specific context of
12:36:17 15 this case. It's part of the general reading that I've
12:36:20 16 done. I've read the documents -- and this is going back
12:36:28 17 to the previous question. Do I remember one sort of
12:36:31 18 documentary evidence that I read, which was the
12:36:33 19 documentation in -- or the report that the state prepared
12:36:41 20 in -- as part of the process for listing butadiene as a
12:36:47 21 toxic air contaminant or hazardous air pollutant.
12:36:51 22 Q Is that the only specific document that you
12:36:53 23 recall reading about butadiene?

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12:36:54 24 A No. I recall reading something that's more
12:36:57 25 recent from the U.S. EPA. But I don't recall precisely
12:37:02 26 what that was.
12:37:02 27 Q Do you know how recent it was?
12:37:07 28 A Not for certain.

12:37:08 1 Q Do you know what criticisms have been made of
12:37:11 2 the Prop 65 no significant risk level for butadiene?
12:37:16 3 A No.
12:37:18 4 Q Other than butadiene, are there any other
12:37:20 5 chemical compounds in ETS that, in your opinion, pose a
12:37:24 6 greater than ten to the minus four cancer risk?
12:37:27 7 A For maximally exposed individuals, yes.
12:37:30 8 Q That's a good point.
12:37:32 9 When you were talking about butadiene, what
12:37:35 10 types of individual exposures were you talking about?
12:37:37 11 A With butadiene, average exposures are
12:37:40 12 sufficiently high to exceed ten to the minus four,
12:37:43 13 according to the approach I used.
12:37:45 14 Q And the approach you used is simply to look
12:37:48 15 at the no significant risk level in Prop 65; is that
12:37:51 16 correct?
12:37:52 17 A That's correct.
12:37:53 18 Q Okay. And when you said the average
12:37:57 19 exposures, are you referring to the median and mean
12:38:00 20 numbers that you used or that you developed in your
12:38:02 21 original declaration?
12:38:04 22 A That's correct.
12:38:04 23 Q Okay. Now, would that be the median or the
12:38:07 24 mean, or would it be both?
12:38:08 25 A I don't recall. I think in the case of
12:38:12 26 butadiene, it's -- either one is sufficient.
12:38:15 27 Q All right. Now, you also used the term
12:38:18 28 "maximally exposed individuals."

12:38:21 1 What do you mean by that term?
12:38:23 2 A Well, in a standard air pollution risk
12:38:26 3 assessment done for permitting the exposure is calculated
12:38:31 4 for somebody living off of the site of the industrial
12:38:35 5 activity who would receive the highest level of exposure
12:38:46 6 over a year-long period. And it's that person's risk that
12:38:50 7 is compared against these bright line values to determine
12:38:54 8 whether the activity should be permitted or not.
12:38:55 9 Q And which air pollution, law, or regulation
12:39:05 10 creates that requirement to consider the maximal exposure?
12:39:07 11 A I don't know.
12:39:08 12 Q Do you know that there is such a law or
12:39:11 13 regulation?
12:39:12 14 A No.
12:39:12 15 Q All right. Let's talk about the maximal
12:39:17 16 exposure, then.
12:39:18 17 Does Exhibit 559 contain your calculations
12:39:22 18 regarding maximal exposure?
12:39:24 19 A No.
12:39:25 20 Q Do you have any separate calculations
12:39:27 21 regarding maximal exposure?
12:39:29 22 A No.
12:39:35 23 Q All right. How would you identify for ETS
12:39:38 24 exposures, the maximal exposure levels?
12:39:42 25 A I don't know what the maximal exposure levels
12:39:46 26 are. I can state, though, as a qualifier that I know that
12:39:50 27 they're higher than the median and they're higher than the
12:39:55 28 high range estimates that I've made in my supplemental

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information that appears as Exhibit 559.
Q How would you calculate maximal exposures?
A The procedure would be to identify either by hypothesis or with supporting data the circumstances that would cause the highest exposure to an individual. And what we'd be looking for is the lowest ventilation rates in a residence in which smoking occurs, combined with the highest number of cigarettes smoked at that environment.
Q Other than butadiene, are there any other compounds found in an ETS high exposure that would exceed the ten to the minus four level?
MR. McGUIRE: Could I just -- I think the two of you are wanting to get to the same spot but are missing each other.
He referred to it as being the high range.
Is that what you meant, Pat, by your question?
MR. CAFFERTY: Yes.
MR. McGUIRE: So he's referring to the exposures that you have on 559.
THE WITNESS: Yes.
MR. McGUIRE: All right.
THE WITNESS: To answer that question, I would need to refer back to my original declaration.
MR. CAFFERTY: Okay. Sure. That's in the exhibits there right in front of you. What was that that we had there before? Exhibit 27, I believe.
THE WITNESS: So in addition to butadiene,

acrylonitrile would also exceed ten to the minus four, and benzene would.
BY MR. CAFFERTY:
Q Okay. And how do you determine that acrylonitrile would exceed ten to the minus four?
A By comparing the high-range exposure estimates I've made in Table 1D for that compound with Prop 65 NSRL threshold that appears in Table 1B of my first declaration.
Q Okay. So, basically, you're comparing numbers in Exhibit 559 to numbers in Exhibit 27?
A Correct.
Q How do you determine that the benzene exposure would exceed ten to the minus four?
A Using a similar procedure.
Q Okay. Let's talk about ten to the minus five.
What compounds other than butadiene would exceed the ten to the minus five level using either your mean or your median?
A I'm sorry. The -- now we've jumped back to not the high-range estimate --
Q That's right.
A -- but rather to the median?
Q The median.
A Or my best estimate is what I've called it.
Q Your best estimate. Let's use your best estimate. And that's in relation to Exhibit 27.

A Correct.
In addition to butadiene, acrylonitrile and benzene exceed ten to the minus five.
Q And you get that out of your -- what is it?

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12:43:54 5 Table 1B in your declaration?
12:43:56 6 A Correct.
12:43:56 7 Q All right. And that's a simple comparison of
12:44:00 8 your best estimate for?
12:44:04 9 A What I call average exposure there.
12:44:06 10 Q Your average exposure for acrylonitrile and
12:44:09 11 benzene being greater than the Prop 65 no significant risk
12:44:14 12 level, correct?
12:44:15 13 A Correct.
12:44:15 14 Q Okay. Do you have any basis to determine
12:44:18 15 whether the Prop 65 no significant risk level for
12:44:21 16 acrylonitrile is a valid or an invalid number?
12:44:25 17 A No. No basis.
12:44:26 18 Q Do you have any basis to determine whether
12:44:28 19 the Prop 65 no significant risk level for benzene is a
12:44:31 20 valid or an invalid number?
12:44:33 21 A Nothing for any of these -- or these two,
12:44:36 22 anyway, beyond the fact that they appear in Prop 65 after
12:44:42 23 scientific review as part of the process that gets them
12:44:45 24 admitted.
12:44:46 25 Q Okay. All right. Now, let's take your
12:44:48 26 high-range exposure scenario.
12:45:02 27 Which of your -- which of the chemical
12:45:05 28 compounds using your high-range exposure scenario would

12:45:10 1 exceed the ten to the minus five level other than
12:45:13 2 butadiene, acrylonitrile, and benzene?
12:45:18 3 A Acetaldehyde, cadmium, formaldehyde, NDMA,
12:45:46 4 and that's all.
12:45:46 5 Q And for those four compounds, how do you
12:45:53 6 determine that the risk would be greater than ten to the
12:45:56 7 minus five?
12:45:57 8 A By making a direct comparison between the
12:45:59 9 entries for those compounds in Table 1D, my high-range
12:46:03 10 exposure estimate, with the Prop 65 NSRL levels reported
12:46:10 11 in Table 1B.
12:46:11 12 Q Okay. So, again, you're simply comparing
12:46:14 13 numbers in Exhibit 559 to numbers in Exhibit 27?
12:46:17 14 A That's correct.
12:46:18 15 MR. CAFFERTY: Okay. Why don't we take a
12:46:20 16 break for lunch now.
12:46:20 17 MR. McGUIRE: That's great. Thank you.
12:46:22 18 VIDEOGRAPHER: We are off the record. And
12:46:23 19 the time is 12:45.
12:46:25 20 (Lunch recess.)
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12:47:21 1 San Diego, California; Monday, July 10, 2000; 2:02 p.m.
14:00:18 2
14:00:18 3 VIDEOGRAPHER: We are back on the record, and
14:02:58 4 the time is 2:02.
14:02:59 5
14:02:59 6 EXAMINATION (RESUMED)
14:02:59 7 BY MR. CAFFERTY:
14:02:59 8 Q Dr. Nazaroff, we're back now after lunch. I
14:03:06 9 wanted to continue following up on some of the opinions

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14:03:08 10 that Mr. Kodsi asked you about this morning and just make
14:03:11 11 sure that we haven't fully flushed out.
14:03:15 12 One of the things you testified about was the
14:03:17 13 number of Californians exposed in their homes.
14:03:20 14 Have you done any further work to develop any
14:03:21 15 additional bases for the number of Californians that you
14:03:24 16 believe are exposed in their homes to ETS?
14:03:28 17 A No. I believe I answered that this morning
14:03:31 18 as well.
14:03:31 19 Q Have you changed your opinion in any way
14:03:34 20 about the number of Californians who are exposed in their
14:03:39 21 homes?
14:03:39 22 A No.
14:03:39 23 Q Okay. What is your understanding of the term
14:03:44 24 "smoking prevalence"?
14:03:46 25 A The proportion of population that smokes.
14:03:49 26 Q Okay. Would it be fair to say that as the
14:03:52 27 smoking prevalence decreases, the number of Californians
14:03:57 28 exposed to ETS also decreases?

14:03:59 1 A That's likely. Sure.
14:04:01 2 Q Okay. How does the number of Californians
14:04:03 3 exposed today compare to the number of Californians who
14:04:07 4 were exposed, say, five years ago?
14:04:09 5 A I haven't done that specific calculation, but
14:04:18 6 I did look at a comparison with ten years ago. And I
14:04:21 7 think this was addressed in the original deposition. And
14:04:25 8 the number of smokers has decreased. So I expect the
14:04:28 9 number of exposed individuals to have decreased.
14:04:30 10 Q What I was trying to find out is whether or
14:04:33 11 not you could tell me how the number of people exposed
14:04:37 12 today compares to the number of people who were exposed
14:04:40 13 ten and a half months ago, last August when we took your
14:04:44 14 deposition.
14:04:44 15 A My opinion is that there will not have been
14:04:47 16 much change over that time frame.
14:04:49 17 Q Do you know what the change is?
14:04:50 18 A No.
14:04:51 19 Q How would you calculate it?
14:04:53 20 A I wouldn't calculate it. I would need some
14:04:57 21 data, which I don't have, to -- well, to then calculate it.
14:05:04 22 Q Okay. What data would you need to calculate
14:05:08 23 it?
14:05:08 24 A The main parameter would be the prevalence of
14:05:14 25 smoking.
14:05:15 26 Q Okay. Do you know if the number of
14:05:18 27 Californians exposed in their residences to ETS today is
14:05:22 28 greater, or less than the number who were exposed last

14:05:25 1 August?
14:05:25 2 A I don't know.
14:05:27 3 Q Okay. Do you have any information about
14:05:39 4 changes in smokers' behavior to avoid exposing people in
14:05:44 5 homes to their ETS?
14:05:47 6 A That question will have to be qualified a
14:05:50 7 little more carefully.
14:05:53 8 Changes over what time frame?
14:05:54 9 Q Well, let's say changes over the last ten
14:05:57 10 years.
14:05:57 11 A I don't have any scientific information. I
14:06:06 12 mean, I've heard anecdotes. That's about all.
14:06:10 13 Q Have you reviewed any literature about that?
14:06:12 14 A No, not on that specific point.

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14:06:16 15 Q Okay. Would it be fair to say that smokers'
14:06:20 16 behaviors in general over the last ten years have changed
14:06:23 17 so that fewer Californians who smoke now smoke in their
14:06:29 18 homes?
14:06:30 19 A I have no basis to conclude that.
14:06:32 20 Q You haven't seen any literature that would
14:06:35 21 address that?
14:06:36 22 A Not that specific point, no.
14:06:38 23 Q Okay. Have you seen any literature to
14:06:39 24 indicate that smokers in California smoke less in their
14:06:46 25 residences than they did ten years ago?
14:06:51 26 A No. And I guess I'm a little confused as to
14:06:56 27 how that question is different than the one I just
14:06:59 28 answered.

14:06:59 1 Q Well, one of them was about people who smoke
14:07:02 2 in the home and don't -- or smoked in the home ten years
14:07:05 3 ago and don't smoke in the home today. The other is that
14:07:08 4 they smoke less cigarettes in the home than they did ten
14:07:12 5 years ago.
14:07:13 6 I'm just trying to see if you've got
14:07:15 7 information about either of those two subjects.
14:07:17 8 A Well, I have information on the average
14:07:20 9 number of cigarettes that smokers consume in California.
14:07:24 10 That number has declined over the last decade. But -- and
14:07:30 11 that's laid out in the declaration.
14:07:31 12 Q Right.
14:07:32 13 A But I don't have specific information about
14:07:34 14 how -- where the people smoke may have changed.
14:07:41 15 Q Okay. Now, Mr. Kodsi asked you some about
14:08:15 16 your mean and median concentrations that appeared in your
14:08:19 17 declaration last year.
14:08:21 18 How many people in California are exposed
14:08:25 19 today to either the mean or the median concentration set
14:08:29 20 forth in your declaration?
14:08:32 21 A I have no way of answering that, as it's
14:08:38 22 phrased. If one places enough level of precision on that,
14:08:45 23 those answers, the literal response would probably be
14:08:50 24 zero. But that's not a meaningful reaction to that
14:08:54 25 question. I guess I don't understand what the -- what the
14:08:57 26 point is that you're raising.
14:08:59 27 About half the people would be exposed at
14:09:03 28 higher levels than the median, half the people who are

14:09:07 1 exposed. And about half would be exposed at lower
14:09:10 2 levels. That's what we mean by the median.
14:09:12 3 Q Okay. Is -- so would it be fair to say that
14:09:17 4 about, what, a million and a half people are exposed at or
14:09:21 5 above the median and about a million and a half are
14:09:23 6 exposed at or below the median?
14:09:25 7 A Yeah. That's what would follow from what
14:09:28 8 I've put forward in the declaration.
14:09:29 9 Q What about your high-range estimates? How
14:09:31 10 many people in California today are exposed at the
14:09:34 11 high-range estimates?
14:09:36 12 A Do you mean at or above?
14:09:37 13 Q At or above.
14:09:39 14 A Okay. Then I understand the question.
14:09:41 15 That number will be somewhere in the
14:09:47 16 vicinity -- a rough estimate would be 50,000.
14:09:50 17 Q And how do you calculate that?
14:09:52 18 A 50,000 is approximately two percent of 3
14:09:56 19 million, and the high-range estimate was intended to

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14:10:04 20 represent the percentile of the distribution that lies
14:10:11 21 somewhere in the range of 90 to 98 percent. So if it's,
14:10:15 22 in fact, 98 percent, the 98th percentile that it
14:10:20 23 represents, then I would estimate that 50,000 people are
14:10:23 24 above that level. If it's actually the 90 percentile,
14:10:27 25 then the result would be higher.
14:10:29 26 MR. McGUIRE: How much higher?
14:10:30 27 THE WITNESS: 300,000.
14:10:31 28 BY MR. CAFFERTY:

14:10:31 1 Q And that would be at the 90th percentile?
14:10:34 2 A If -- yeah.
14:10:35 3 Q Is that reflected on your high-range
14:10:37 4 estimates that are set forth in Exhibit 559?
14:10:40 5 A The high-range estimates -- Table 1C of that
14:10:44 6 exhibit indicates in the final column of that table what
14:10:48 7 percentile I'm estimating for any particular method. The
14:10:52 8 problem is -- I mean, ideally, I'd like to have just a
14:10:58 9 single value, say, the 95th percentile and apply that
14:11:03 10 using all the methods. But the methods are sufficiently
14:11:06 11 different in the way that the data that they use and the
14:11:08 12 approach I use for the calculations, that it's not
14:11:11 13 straightforward and may even not be possible to make a
14:11:14 14 single consistent percentile value at that high end.
14:11:18 15 So, instead, I think it -- I chose to use a
14:11:22 16 range of percentile values that are in the vicinity of
14:11:30 17 95th percentile.
14:11:31 18 Q Okay. Right before lunch, I was asking you
14:11:36 19 questions about your opinions regarding the significance
14:11:43 20 of ETS exposures with respect to possible health
14:11:46 21 outcomes. And what we talked about were lung -- or excuse
14:11:52 22 me -- cancer risk, which would be one form of health
14:11:57 23 outcome, correct?
14:11:58 24 A The specific cases that we considered where
14:12:02 25 there were bright line values --
14:12:04 26 Q Right.
14:12:05 27 A -- that was for cancer, yes.
14:12:06 28 Q Are there any other possible health outcomes

14:12:10 1 that you consider as part of your opinion?
14:12:12 2 A Not specifically, no.
14:12:13 3 Q Are there any that you generally considered?
14:12:17 4 A Well, the other part of my opinion that puts
14:12:20 5 the risk -- or the exposure estimates in context is to
14:12:24 6 compare exposures for high-range nonsmokers to exposures
14:12:31 7 for average smokers. That's set forth in Exhibit 559,
14:12:37 8 Table 1E.
14:12:39 9 And I don't extend beyond the comparison of
14:12:46 10 exposures in that case. But to the extent that cigarette
14:12:49 11 smoking induces adverse health consequences other than
14:12:53 12 lung cancer, one can infer or make a connection between
14:13:00 13 what I've done and other health outcomes.
14:13:03 14 Q And how would one do that?
14:13:10 15 A The -- it's -- I guess I have no -- no answer
14:13:27 16 for that. I don't know.
14:13:28 17 Q Have you done that?
14:13:29 18 A No.
14:13:29 19 Q Do you know whether any of plaintiffs'
14:13:32 20 experts who are going to testify in this case have done
14:13:35 21 that?
14:13:35 22 A No, I do not know.
14:13:36 23 Q Okay. In developing your opinions regarding
14:13:56 24 the relevance of epidemiology studies to California

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14:14:02 25 exposures, what review of the epidemiology literature did
14:14:07 26 you do?
14:14:07 27 A I have not done a formal review of the
14:14:11 28 epidemiological literature. I've read a number of papers

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14:14:14 1 to just get a sense of context or prospective.
14:14:18 2 Q Which papers did you read?
14:14:20 3 A I'm certain that I can't recall them all. I
14:14:27 4 can recall two. One by He et al on -- it was a
14:14:39 5 meta-analysis of cardiovascular disease caused by
14:14:43 6 environmental tobacco smoke exposure.
14:14:46 7 And the second one by Hackshaw, I believe, on
14:14:52 8 lung cancer, an epidemiological study -- meta-analysis of
14:14:57 9 lung cancer studies associated with ETS exposure.
14:15:00 10 Q Did you read any literature regarding
14:15:02 11 epidemiology with respect to anything other than lung
14:15:05 12 cancer and cardiovascular disease?
14:15:09 13 A I don't believe so.
14:15:11 14 Q Now, this morning when Mr. Kodsi was asking
14:15:27 15 you questions, you used, as an example, a bingo parlor in
14:15:32 16 Las Vegas.
14:15:33 17 Do you remember that?
14:15:33 18 A I do. But now that I think about it again,
14:15:36 19 it may have been in Reno.
14:15:37 20 Q In Reno. Okay.
14:15:39 21 Well, now that you thought about it, your
14:15:42 22 bingo parlor in Reno.
14:15:44 23 What levels of RSP would you have in a bingo
14:15:47 24 parlor in Reno?
14:15:48 25 A I don't know. High.
14:15:51 26 Q Do you know how high they might be?
14:15:53 27 A 500, 1,000 micrograms per cubic meter.
14:15:59 28 Q Somewhere between 500 and 1,000?

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14:16:01 1 A That's an educated opinion, but not one
14:16:04 2 that's based on solid empirical data.
14:16:07 3 Q Have you ever seen any empirical data for
14:16:10 4 casino environments?
14:16:12 5 A No.
14:16:12 6 Q Do you know if any exist?
14:16:14 7 A No, I don't know.
14:16:17 8 Q Have you, yourself, ever conducted any indoor
14:16:20 9 air quality analyses to measure the level of ETS
14:16:24 10 constituents in the indoor air?
14:16:27 11 A Yes.
14:16:27 12 Q When did you do that?
14:16:30 13 A I've made -- well, I did that in studies I
14:16:37 14 conducted in the 1980s, I guess.
14:16:39 15 Q Okay. And what kinds of studies were those?
14:16:43 16 A We were looking at environmental tobacco
14:16:48 17 smoke particles and the potential for controlling particle
14:16:55 18 levels from environmental tobacco smoke using portable air
14:16:58 19 cleaners.
14:16:59 20 I've also supervised, as a Ph.D. advisor,
14:17:03 21 research on environmental tobacco smoke from a few
14:17:09 22 different doctoral students.
14:17:10 23 Q When you did the work in the 1980s where you
14:17:12 24 measured ETS constituents, were you measuring RSP?
14:17:17 25 A We were measuring particle-sized
14:17:20 26 distributions so one could calculate from that, RSP.
14:17:22 27 Q All right. And what types of environments
14:17:25 28 were you measuring the RSP in?

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14:17:27 1 A That was in a research house. So we had a
14:17:29 2 test facility which was a -- it was a sort of a mockup of
14:17:40 3 an apartment. And we conducted the experiments in that
14:17:43 4 setting.
14:17:43 5 Q Have you ever measured any ETS constituent
14:17:47 6 levels in a real world environment?
14:17:48 7 A I was involved in a study that made
14:17:58 8 measurements of formaldehyde in real residential
14:18:03 9 buildings, including some in which smoking was done. That
14:18:06 10 was in the earlier part of the 1980s.
14:18:09 11 You know, I went out into the field and
14:18:12 12 helped with the sampling. I don't recall in detail how
14:18:16 13 much I actually did with respect to measuring formaldehyde.
14:18:20 14 Q Have you ever measured real world levels of
14:18:23 15 RSP in an ETS environment?
14:18:27 16 A I don't believe so, no.
14:18:33 17 Q At 500 micrograms of RSP per cubic meter,
14:18:41 18 what does the air look like?
14:18:42 19 A It's hazy.
14:18:44 20 Q At 1,000 micrograms per cubic meter, what
14:18:47 21 does the air look like? And that's RSP. I'm sorry.
14:18:50 22 A Hazier.
14:18:52 23 Q Hazier?
14:18:53 24 A Yeah.
14:18:53 25 Q Are the people on the other side of the room
14:18:56 26 obscured?
14:18:57 27 A I don't know.
14:19:02 28 MR. McGUIRE: Vague as to the size of the

14:19:04 1 room.
14:19:04 2 BY MR. CAFFERTY:
14:19:04 3 Q All right. Now, this morning when Mr. Kodsi
14:19:11 4 was asking you questions, I heard you say that your
14:19:14 5 original declaration was in what you termed the Prop 65
14:19:17 6 case.
14:19:18 7 What is your understanding of what this case
14:19:20 8 is about today?
14:19:22 9 MR. McGUIRE: Don't answer that. He's
14:19:23 10 already gone through this. Before you walked in, it was
14:19:27 11 the same question -- it was the first question that Neil
14:19:29 12 Kodsi asked. He asked it. He answered it. It's done.
14:19:32 13 MR. CAFFERTY: All right. I withdraw the
14:19:34 14 question. That's a valid concern.
14:19:36 15 Let's mark a couple of documents here.
14:19:45 16 (Exhibits 560 and 561 were marked for
14:20:43 17 identification.)
14:20:43 18 BY MR. CAFFERTY:
14:20:43 19 Q Dr. Nazaroff, let me show you the first
14:20:46 20 document that's been marked as Exhibit 560 for purposes of
14:20:50 21 identification.
14:20:51 22 Could you identify that document for the
14:20:53 23 record.
14:20:53 24 A Yes. This is a letter that is addressed to
14:20:58 25 me from John McGuire, dated May 23rd, 2000.
14:21:02 26 Q All right. Down in the bottom corner, it has
14:21:04 27 the legend PX-WWN-, and we'll just say the last two
14:21:10 28 numbers, 96.

14:21:11 1 That's the one you have in front of you,
14:21:14 2 right?
14:21:14 3 A Yes.
14:21:14 4 Q Is that a letter you received from
14:21:16 5 Mr. McGuire?

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14:21:17 6 A Yes. I have a "received" note that's in my
14:21:19 7 handwriting up at the top.
14:21:20 8 Q Okay. That's what that little handwritten
14:21:22 9 designation means?
14:21:23 10 A Yeah.
14:21:23 11 Q So you received it on, what, May -- what is
14:21:26 12 that? 26th?
14:21:27 13 A I think so. I'm not sure. My handwriting is
14:21:31 14 not -- in the photocopy, not perfectly legible.
14:21:36 15 Q All right. What, generally, is the content
14:21:38 16 of this letter?
14:21:39 17 A It addresses an amendment to the -- I'm not
14:21:48 18 sure what the proper legal term is. But the domain that
14:21:51 19 I'm expected to testify on in this case.
14:21:54 20 Q All right. Okay. Now, there are some
14:21:56 21 changes that are indicated to your earlier designation
14:22:01 22 about your testimony.
14:22:03 23 I guess the deletions are shown with a line
14:22:05 24 through them, and the additions are shown in italics; is
14:22:11 25 that right?
14:22:11 26 A That's correct.
14:22:12 27 Q And who is it that actually made these
14:22:14 28 changes in your -- in the description of your testimony?

14:22:16 1 A I don't know.
14:22:16 2 Q Was that something that you did?
14:22:19 3 A Not -- I was consulted with respect to this
14:22:27 4 process of changing the result, but I didn't prepare this
14:22:31 5 letter. And I don't recall whether I gave them this text
14:22:34 6 or whether they proposed this text and I approved it.
14:22:39 7 Q Let's look at the first line of the
14:22:44 8 description of your testimony, and I see the word
14:22:46 9 "average" is taken out of the description.
14:22:48 10 Can you tell me why the word "average" is now
14:22:52 11 no longer included in your description?
14:22:54 12 MR. McGUIRE: Calls for speculation.
14:22:55 13 Don't guess as to what my reasoning may have
14:22:59 14 been since I signed the affidavit -- or the
14:23:01 15 declaration. But if you know, if I told you, you can tell
14:23:05 16 him.
14:23:07 17 THE WITNESS: I don't know for certain.
14:23:10 18 BY MR. CAFFERTY:
14:23:10 19 Q With the deletion of the word "average," how
14:23:13 20 does that change the testimony that you intend to give in
14:23:17 21 this case?
14:23:18 22 MR. McGUIRE: Calls for speculation.
14:23:20 23 Answer if you know.
14:23:23 24 THE WITNESS: Okay. Well, I think now -- I
14:23:26 25 think. I know in addition to testifying to the material
14:23:31 26 that was in my original declaration about average levels
14:23:34 27 of ETS exposure, I will also be commenting or testifying,
14:23:42 28 expressing opinion about the exposure to those who receive

14:23:45 1 higher than average levels of exposure, this high-end or
14:23:49 2 high-range estimate.
14:23:51 3 BY MR. CAFFERTY:
14:23:51 4 Q Okay. I also see that there is several lines
14:23:57 5 that are deleted by showing the line through them.
14:24:00 6 What is your understanding as to why that
14:24:02 7 information or that material was deleted?
14:24:05 8 MR. McGUIRE: Calls for speculation.
14:24:08 9 THE WITNESS: I believe it to be because this
14:24:11 10 material focuses on the Prop 65 prospective on the case.

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14:24:17 11 And since the Prop 65 portion of the case isn't in
14:24:21 12 contention anymore, it's no longer germane.
14:24:24 13 BY MR. CAFFERTY:
14:24:24 14 Q Okay. Now, let me show you what has been
14:24:30 15 marked as Exhibit 561 for purposes of identification. I
14:24:34 16 just ask if you can identify that for the record, please.
14:24:36 17 A Yes. This appears to be a facsimile
14:24:39 18 transmission to me from Karen Frostrom, dated May 22nd,
14:24:45 19 2000. And it has a Bates number PX-WWN-95.
14:24:50 20 Q Okay. And I see at the top, there's a
14:24:53 21 handwritten notation. It looks like "Recd."
14:24:57 22 Is that "received"?
14:24:57 23 A That's correct.
14:24:58 24 Q Is that in your handwriting?
14:25:00 25 A Yes.
14:25:00 26 Q It says "5/22/00"?
14:25:03 27 A Yes.
14:25:03 28 Q Does that mean you received it on May 22nd?

14:25:06 1 A Yes.
14:25:06 2 Q What does the "10 minutes" beneath that mean?
14:25:09 3 A Oh. That, I believe, amounts to how much
14:25:15 4 time I spent in connection with -- not -- I may have done
14:25:18 5 something more with this document that's not reflected in
14:25:20 6 the ten minutes. But ten minutes was kind of the
14:25:23 7 immediate time that it took me to read this. I think I
14:25:25 8 may have called Karen about it before I put it aside.
14:25:32 9 Q So that's a reflection of how much time you
14:25:35 10 spent reviewing this document?
14:25:36 11 A It's a reflection of my initial review and
14:25:39 12 evaluation. Normally, this material is logged in my
14:25:48 13 notebook, that is, billing information. It may be that I
14:25:52 14 didn't have my notebook handy at the time, and I just
14:25:56 15 wanted to make a note for myself for future reference.
14:26:00 16 Q Prior to receiving this facsimile
14:26:03 17 transmission reflected in Exhibit 561, had you seen any
14:26:09 18 description of what your new testimony was going to be?
14:26:12 19 A I don't recall.
14:26:13 20 Q Had you had any discussions with anybody
14:26:15 21 about what your new testimony would be?
14:26:17 22 A I believe so, but I'm not certain.
14:26:19 23 Q Okay. Let's mark this as the next one in
14:26:24 24 order, 562. Now I'm getting the hang of this.
14:26:29 25 (Exhibit 562 was marked for identification.)
14:26:33 26 BY MR. CAFFERTY:
14:26:33 27 Q I'm showing you a document that's been marked
14:26:37 28 as Exhibit 562 for purposes of identification.

14:26:40 1 Do you have that in front of you?
14:26:41 2 A I do.
14:26:41 3 Q All right. This is a document that I
14:26:44 4 received from Mr. McGuire on Friday, and it purports to be
14:26:50 5 a notebook that you keep regarding the work that you
14:26:53 6 described in -- or that you performed in this case.
14:26:56 7 Would you identify that exhibit, please, for
14:27:00 8 the record.
14:27:00 9 A Yes. Well, it's approximately a hundred
14:27:04 10 pages of material, and it has been Bates stamped. It's
14:27:12 11 photocopied material. The material, just glancing through
14:27:18 12 it, does, in fact, appear to be my notebook in connection
14:27:21 13 with this case.
14:27:22 14 Q All right. What does this document look like
14:27:28 15 in its original form? Is it a notebook of some sort?

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14:27:31 16 A Yes. It's a notebook that is commonly used
14:27:37 17 for keeping laboratory records, and it's bound. It has a
14:27:44 18 blue cover. It's page size is about the same size
14:27:47 19 indicated here. This is a full-size reproduction.
14:27:50 20 Q And how many of these blue-bound volumes does
14:27:56 21 this -- does Exhibit 562 represent?
14:27:59 22 A Just a single volume.
14:28:01 23 Q About how much of the volume is full?
14:28:02 24 A Between a half and two thirds.
14:28:04 25 Q Okay. So each page is consecutive in your
14:28:10 26 notebook?
14:28:11 27 A Yes.
14:28:11 28 Q And do you fill them out chronologically in

14:28:14 1 your notebook?
14:28:14 2 A Yes.
14:28:14 3 Q All right. Let me direct your attention
14:28:17 4 to -- and, by the way, this is all in your handwriting,
14:28:21 5 correct?
14:28:21 6 A That is correct.
14:28:22 7 Q Okay. Let me direct your attention to
14:28:24 8 page -- I'll use the last two words, which is -- or the
14:28:30 9 last two numbers. Page 85.
14:28:51 10 Do you have that in front of you?
14:28:52 11 A I do.
14:28:53 12 Q All right. In fact, let me just have you
14:28:55 13 turn back one page to page 84. And the last entry that I
14:29:01 14 see on page 84 is -- it looks like "11/6/99."
14:29:07 15 Am I reading that correctly?
14:29:08 16 A Yes. That's correct.
14:29:09 17 Q And it says "Received," and it says
14:29:11 18 "5,876.50."
14:29:14 19 I guess that's 5,876 dollars and 50 cents?
14:29:17 20 A That is correct.
14:29:18 21 Q What does that represent?
14:29:19 22 A Payment on the bill from -- I guess from
14:29:23 23 September.
14:29:24 24 Q All right.
14:29:25 25 A Maybe September and August.
14:29:28 26 Q Then I see "Balance zero," then, at the
14:29:31 27 bottom. The very last entry.
14:29:32 28 A Right.

14:29:33 1 Q Is there anything more that was on this page,
14:29:35 2 or is that the bottom of the page?
14:29:37 3 A Well, without looking at the original
14:29:39 4 document, I can't confirm that it's the last thing. But
14:29:41 5 it appears to be.
14:29:42 6 Q All right. Now let's turn to the next page,
14:29:45 7 which is 85. And the entry there -- the first entry that
14:29:48 8 I see at the top is "5/12/00."
14:29:52 9 What does that mean?
14:29:53 10 A May 12th, 2000.
14:29:56 11 Q Did you do any work on this case between
14:30:02 12 November 6th, 1999 and May 12th, 2000?
14:30:06 13 A No, I did no work on the case.
14:30:10 14 Q Okay. All right. Then I see at the top
14:30:12 15 here, a reference that says "phone call from Karen
14:30:17 16 Frosburg."
14:30:18 17 And she's with Mr. McGuire's office, correct?
14:30:20 18 A Yeah. But I think I got her name wrong.
14:30:22 19 Q Okay.
14:30:23 20 A It's Frostrom, right? Okay. Yes, she's with

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14:30:28 21 Mr. McGuire's office.
14:30:29 22 Q All right. Now, I see at the top, it says
14:30:32 23 "5:05 - 5:50 p.m., 45 minutes," does that indicate that
14:30:38 24 your call with Ms. Frostrom was a 45-minute phone call?
14:30:44 25 A Probably so, yes. It's possible that after I
14:30:49 26 hung up with her, I did a little bit of additional work
14:30:52 27 that would be reflected in that total.
14:30:53 28 Q Was anybody else on that phone call other

14:30:56 1 than yourself and Ms. Frostrom?
14:30:59 2 A I suspect Mr. McGuire was. I seem to recall
14:31:02 3 that.
14:31:03 4 Q I see his name written down right below
14:31:05 5 there. It says "Mickey McGuire."
14:31:07 6 Does that indicate that he was involved in
14:31:08 7 the phone call, or not, or can you tell?
14:31:11 8 A Not definitively. It may be that she was
14:31:13 9 explaining to me that he was taking over as lead
14:31:16 10 attorney. I don't recall.
14:31:18 11 Q I see some other notes under here. "ETS,"
14:31:29 12 and then there is an arrow, "False sense of security."
14:31:32 13 Is that what that says?
14:31:33 14 A That is what that says.
14:31:34 15 Q What does that mean?
14:31:35 16 A I don't remember. I often make notes while a
14:31:40 17 telephone call is taking place, and, you know, months
14:31:45 18 later, I look back and say, you know, I don't recall what
14:31:49 19 the note meant.
14:31:49 20 Q Was that something that somebody told you, or
14:31:53 21 was that a thought that you had? What is your practice
14:31:55 22 with respect to writing notes down?
14:31:58 23 A In telephone calls, I'm usually jotting down
14:32:00 24 things that other people are mentioning.
14:32:02 25 Q All right. Then I see the next entry is
14:32:05 26 "Dr. Jenkins," and then there's an arrow, and it says
14:32:09 27 "retained by Philip Morris." And there's something that's
14:32:13 28 scratched out underneath.

14:32:14 1 What is that that's scratched out
14:32:15 2 underneath? Do you know?
14:32:16 3 A No. No, I don't know.
14:32:18 4 Q Okay. What is the significance of writing
14:32:22 5 down "Dr. Jenkins, retained by Philip Morris"?
14:32:25 6 A Well, the significance for me was that he
14:32:33 7 had -- he is the author of some of the work that I relied
14:32:38 8 on in forming my opinion that appears in my declaration.
14:32:42 9 Q Okay. So -- and why would that be
14:32:53 10 significant to you?
14:32:57 11 A It doesn't say so here, but I know from later
14:33:06 12 conversations, and it may have come up at this time, that
14:33:10 13 I was asked to look at his testimony as a rebuttal
14:33:18 14 witness. So this note is related to part of what I
14:33:26 15 understand my assignment to be in this case.
14:33:28 16 Q Okay. The next thing down is actually a
14:33:33 17 phrase that says "substantial factor in causing" -- what
14:33:37 18 is that? "Disease"?
14:33:39 19 A "Disease."
14:33:40 20 Q What does that mean?
14:33:42 21 A I don't know what the words say.
14:33:46 22 "Substantial factor in causing disease." I think -- it
14:33:50 23 follows a line that says, "ETS within range of customary
14:33:53 24 exposure."
14:33:53 25 As I recall -- I recall being told that one

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14:34:00 26 of the important questions in this case is whether ETS
14:34:04 27 exposure is a significant factor or a substantial factor
14:34:08 28 in causing disease.

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14:34:09 1 Q Who was it that told you that?
14:34:13 2 A Either -- I don't recall. But by inference,
14:34:16 3 since it appears on this page, it was either Karen
14:34:19 4 Frostrom or if Mr. McGuire was on the phone, it may have
14:34:24 5 been him.
14:34:24 6 Q Then I see the notation "fetus and
14:34:27 7 asthmatics."
14:34:28 8 What does that refer to?
14:34:30 9 A The possibility of particular subpopulations
14:34:34 10 that may be at higher risk than others from their exposure.
14:34:37 11 Q Okay. And do you have any opinions about
14:34:41 12 that area?
14:34:43 13 A None that I will be advancing in the case.
14:34:48 14 Q Then something is redacted, and the next
14:34:53 15 thing that appears is "concern with range of exposure."
14:34:56 16 And then a downward arrow, "people exposed at levels."
14:35:01 17 And then "ETS & cancer" and "ETS & lung disease."
14:35:04 18 What does all that mean?
14:35:05 19 A Well, this, again, comes back, I think, to
14:35:08 20 the -- in my understanding, to the modified charge to me
14:35:13 21 in this case to look beyond just average levels of
14:35:17 22 exposure but to portions of the population that may be
14:35:21 23 exposed at higher than average levels.
14:35:24 24 And so that's what this line "concerned with
14:35:28 25 range of exposure" means, that attorneys on whose
14:35:31 26 behalf -- or who have hired me are interested in my
14:35:39 27 opinions, not just on average exposure conditions, but the
14:35:42 28 range of exposure conditions.

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14:35:44 1 Q Including the high range of exposure
14:35:46 2 conditions; correct?
14:35:47 3 A Sure. Yeah.
14:35:48 4 Q Let's turn to page 86, and there are some
14:36:05 5 references to Slotkin. It says "nicotine."
14:36:09 6 And what is that? "Pharmacology" underneath
14:36:11 7 it?
14:36:11 8 A Yes.
14:36:11 9 Q What does the next line say?
14:36:18 10 A "Fetal" is the first word. I can't make out
14:36:21 11 the second word. And then it says "infant development."
14:36:25 12 Q All right. Then as you go down the page,
14:36:34 13 there is a reference to "Roger Jenkins, ETS chemistry."
14:36:37 14 What does that next line say?
14:36:38 15 A "Exposure," "design," and, again, I can't
14:36:46 16 make out my own writing.
14:36:48 17 Q Is that "conduct"?
14:36:50 18 A If it is, I don't know what it's referring to.
14:36:52 19 Q And then the next line says "conc levels,
14:36:59 20 home."
14:36:59 21 Is that concentration levels?
14:37:01 22 A That's what it's intended to mean, yes.
14:37:03 23 Q What does that mean?
14:37:06 24 A I don't recall.
14:37:06 25 Q All right. And then at the bottom, I see
14:37:10 26 "epidemiologist" and a question mark.
14:37:12 27 What does that mean?
14:37:13 28 A I think that was a flag from me, maybe a

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14:37:19 1 thought I had during the conversation to bring to their

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14:37:24 2 attention, that is, the attorneys that I was speaking
14:37:28 3 with -- or the attorney that I was speaking with, the
14:37:31 4 potential need for an epidemiologist to be included among
14:37:34 5 the experts on this side of the case.
14:37:36 6 Q And what did you tell them about that?
14:37:37 7 A I suggested it was an important line of
14:37:40 8 argument or line of reasoning, and that they should have
14:37:45 9 somebody that has strong expertise in that area.
14:37:48 10 Q Did you make any suggestions as to who might
14:37:50 11 be appropriate for that job?
14:37:53 12 A No, I didn't.
14:37:54 13 Q Let's go to page 87, which is what I really
14:37:59 14 wanted to focus on. And I see a list of five things at
14:38:02 15 the top of the page.
14:38:03 16 What do those five things represent?
14:38:05 17 A These were notes I made that had to do with
14:38:18 18 the additional effort or work that I should be carrying
14:38:25 19 out in this new phase of the case.
14:38:29 20 Q Okay. Let's take them one at a time.
14:38:32 21 What is the first thing that you understood
14:38:34 22 you were supposed to be doing in this new phase of the
14:38:38 23 case?
14:38:40 24 A The issue was raised with me whether the past
14:38:45 25 six months or a year since I had drafted my original
14:38:49 26 declaration has led to new work that would cause me to
14:38:53 27 reassess what I had done. And so I was asked to consider
14:38:57 28 that.

14:38:57 1 Q Okay. Did you consider that?
14:38:58 2 A Yes.
14:38:59 3 Q What conclusion did you reach?
14:39:01 4 A That new work to the extent that it's been
14:39:06 5 done and published and peer-reviewed literature doesn't
14:39:11 6 change my conclusions.
14:39:14 7 Q What specific new work did you consider in
14:39:16 8 reaching that conclusion?
14:39:21 9 A I actually identified nothing that was
14:39:23 10 particularly relevant. I spent some time looking at the
14:39:27 11 literature through Current Contents online.
14:39:31 12 Q How much time did you spent researching that
14:39:34 13 issue?
14:39:34 14 A I don't recall.
14:39:35 15 Q Okay. And what is Current Contents on line?
14:39:39 16 A Current Contents is a searchable -- well,
14:39:42 17 online, it's a searchable database of bibliographic
14:39:50 18 citations in the scientific and technical literature. And
14:39:58 19 it -- well, that's what it is.
14:40:00 20 Q Okay. Referring back to page 87 of
14:40:07 21 Exhibit 562, what is the second thing that you were asked
14:40:17 22 to do?
14:40:18 23 A To take a look at the deposition of Professor
14:40:22 24 Slotkin.
14:40:23 25 Q And what was your purpose in reviewing that
14:40:28 26 deposition -- or taking a look at that deposition?
14:40:32 27 A I'm not sure I know at this point. I did
14:40:35 28 read the deposition, and I don't recall what my specific

14:40:42 1 charge was in connection with it. And it didn't have a
14:40:49 2 significant influence on my opinion.
14:40:52 3 Q Okay. What conclusions did you reach after
14:40:55 4 reviewing the Slotkin deposition?
14:40:58 5 A That I probably didn't need to have reviewed
14:41:06 6 it for the purpose of this case.

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14:41:08 7 Q Was there anything of relevance in that
14:41:11 8 deposition for your opinions?
14:41:12 9 A I don't recall.
14:41:13 10 Q Was there anything in the deposition that
14:41:15 11 you disagreed with, that Dr. Slotkin said?
14:41:18 12 A I also don't recall.
14:41:19 13 Q All right. The third thing indicated on page
14:41:23 14 87 appears to be "redefinition of my work."
14:41:25 15 A Yes.
14:41:26 16 Q Did I read that correctly?
14:41:28 17 A That's correct.
14:41:28 18 Q What is that about?
14:41:30 19 A I think that has to go with a lot about what
14:41:33 20 we've been discussing this afternoon, which is in the
14:41:35 21 light or in the context of Prop 65 no longer being the
14:41:39 22 central thrust of this case, some of the work that I've
14:41:46 23 done, which is framed in the Prop 65 context, has to be
14:41:50 24 reframed or looked at from a different prospective.
14:41:54 25 Q Okay. And is the different prospective that
14:41:57 26 you were asked to take, the high-range estimates?
14:42:00 27 A That's a piece of it.
14:42:04 28 Q What other pieces are there?

14:42:06 1 A Well, as I understand it, the other important
14:42:09 2 piece has to do with a lot of the comparisons that I've
14:42:13 3 made with the Prop 65 bright line values or no significant
14:42:18 4 risk level values.
14:42:19 5 Those are not, in my understanding now, the
14:42:25 6 crux of the case as they may have been in the earlier
14:42:29 7 version of it.
14:42:29 8 But they're still informative and perhaps
14:42:35 9 relevant to the broad issue of whether exposures are
14:42:42 10 significant.
14:42:42 11 Q Okay. Are there any other pieces to the
14:42:50 12 redefinition of your work?
14:42:51 13 A Not that I recall.
14:42:52 14 Q Okay. Now, the fourth thing is "Jenkins work
14:42:57 15 or any others."
14:42:57 16 What does that mean?
14:42:58 17 A I believe that I -- well, now I don't recall
14:43:09 18 whether I wrote this based on my own interpretation or
14:43:13 19 whether it was a more directed statement that I'm just
14:43:17 20 recording from what I heard on the telephone.
14:43:21 21 But in either event, I know that a part of my
14:43:25 22 charge is to -- since Jenkins has now been declared as an
14:43:31 23 expert witness, to take a close look at his work and
14:43:36 24 assist the attorneys in responding to his testimony.
14:43:39 25 Q Okay. And what have you done to date in
14:43:43 26 reviewing Dr. Jenkins' work?
14:43:46 27 A Nothing yet.
14:43:47 28 Q What do you intend to do?

14:43:50 1 A Read his -- the papers that he's published in
14:43:53 2 the last -- well --
14:43:55 3 MR. McGUIRE: Wait. He's got to get his
14:43:59 4 deposition first. He's not doing anything until we get
14:44:02 5 him under oath.
14:44:02 6 THE WITNESS: Wait until --
14:44:04 7 MR. CAFFERTY: Well, I think -- I think,
14:44:06 8 Mr. McGuire, that it's Dr. --
14:44:08 9 MR. McGUIRE: Well, he answered --
14:44:10 10 MR. CAFFERTY: -- Nazaroff's deposition, not
14:44:13 11 yours.

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14:44:14 12 MR. McGUIRE: I understand that. But you
14:44:15 13 either didn't listen or weren't here this morning when he
14:44:18 14 answered that question that he was going to be rebuttal
14:44:21 15 witness, had nothing to say until after they were deposed.
14:44:25 16 MR. CAFFERTY: Well, that -- it was a
14:44:27 17 different question that I asked him now. I asked him in
14:44:31 18 response to a specific item listed in his handwriting as
14:44:34 19 to something he intends to do, what it is that he intends
14:44:37 20 to do.
14:44:37 21 MR. McGUIRE: Well, okay.
14:44:38 22 MR. CAFFERTY: And I think I'm entitled to an
14:44:40 23 answer to that.
14:44:41 24 THE WITNESS: I intend to read Jenkins' --
14:44:43 25 read and reread Jenkins' recent work related to
14:44:48 26 environmental tobacco smoke, his published work. And I
14:44:51 27 will also, I expect, have a look at his deposition
14:44:57 28 transcript.

14:44:58 1 BY MR. CAFFERTY:
14:44:58 2 Q All right. No. 5 has me stumped.
14:45:01 3 What does No. 5 say?
14:45:03 4 A I can understand why you're stumped. It's
14:45:05 5 actually not that complicated. What it says is "He," H-e,
14:45:10 6 and it has this little squiggle arrow. I don't know. I
14:45:13 7 was doodling when I wrote the arrow. "He" refers to
14:45:15 8 article -- "He" is the first author -- "He" is the first
14:45:17 9 author on an article that is a meta-analysis of
14:45:19 10 cardiovascular disease related to environmental tobacco
14:45:23 11 smoke exposure. And this -- I was making a note to myself
14:45:28 12 that I wanted to have a look at that article.
14:45:32 13 Q Okay. And what have you done with respect to
14:45:34 14 that article?
14:45:35 15 A I read it.
14:45:35 16 Q What conclusions did you reach based on your
14:45:38 17 review of that article?
14:45:39 18 A It looks like the evidence for environmental
14:45:45 19 tobacco smoke possibly being a cause or being a cause of
14:45:50 20 heart disease is accumulating to the point where it's
14:45:56 21 beginning to look pretty strong.
14:45:57 22 Q What is the relevance of that article to your
14:46:00 23 opinions?
14:46:01 24 A It's general background and information and
14:46:09 25 knowledge to me. And I read it as part of a general
14:46:12 26 obligation I feel or charge I feel to look after issues
14:46:17 27 that I'm aware of and bring them to the attention of the
14:46:21 28 attorneys who have hired me.

14:46:27 1 Q Okay. Have you reviewed any other
14:46:29 2 epidemiology literature regarding the association between
14:46:34 3 cardiovascular disease and -- excuse me.
14:46:38 4 Is it cardiovascular, or coronary heart
14:46:41 5 disease that we talked about?
14:46:42 6 A It's cardiovascular. Well, I think it's
14:46:46 7 cardiovascular.
14:46:47 8 Q Have you reviewed any other epidemiology
14:46:49 9 literature regarding cardiovascular disease and ETS other
14:46:52 10 than the He meta-analysis?
14:46:57 11 A I may have read some things in the past, but
14:47:00 12 not recently. Not since the first deposition.
14:47:05 13 Q Okay. All right. And then there's a
14:47:08 14 reference to 5/12/00 on page 87.
14:47:12 15 It looks like you had a call with Brian
14:47:16 16 Brookey; is that correct?

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14:47:16 17 A That's correct.
14:47:18 18 Q What does that indication, "recommend new
14:47:23 19 attorneys" mean?
14:47:23 20 A Oh, he was recommending to me that these new
14:47:27 21 attorneys as basically reasonable people to work for.
14:47:32 22 Q Okay. So he was telling you that
14:47:34 23 Mr. McGuire's firm are good people?
14:47:36 24 A Yeah.
14:47:41 25 Q All right. Now let's turn to page '89. And
14:47:55 26 I see a reference at the top. It says "read deposition of
14:47:59 27 Slotkin" and "10:25 - 10:45," two hours.
14:48:03 28 It looks like you spent two hours reading

14:48:06 1 that deposition; is that right?
14:48:07 2 A That's right.
14:48:08 3 Q And then as you go down, it says, "Read
14:48:10 4 materials on case received 5/28."
14:48:12 5 Is that 5/28/00?
14:48:14 6 A 5/26, I believe.
14:48:16 7 Q 5/26/00.
14:48:22 8 What are the materials you received on
14:48:24 9 5/26/00?
14:48:26 10 A I don't know specifically what I received,
14:48:28 11 but I believe what I got were declarations from at least
14:48:32 12 several of the other experts on the plaintiffs' side of
14:48:38 13 the case.
14:48:38 14 Q Okay. And then I see a reference right below
14:48:42 15 that.
14:48:42 16 I think it says "Bogen;" is that right?
14:48:44 17 A That's right.
14:48:46 18 Q Is that a reference to Ken Bogen?
14:48:48 19 A Yes.
14:48:48 20 Q And then there's a calculation that I see
14:48:51 21 there, an equation, but it doesn't really have an equal
14:48:54 22 sign.
14:48:54 23 I see -- is that an equal sign kind of in
14:48:57 24 between there or an approximate sign?
14:49:00 25 A In the middle of the page on the left-hand
14:49:01 26 side, there's an equal sign.
14:49:06 27 Q Okay. And what is that calculation intended
14:49:09 28 to show?

14:49:10 1 A I was looking at the risk estimates that
14:49:19 2 appeared in Bogen's -- or at least one of the risk
14:49:22 3 estimates that appeared in Bogen's declaration and trying
14:49:26 4 to discern whether it was broadly consistent with
14:49:30 5 calculations that I've read or not.
14:49:32 6 Q Okay. And what conclusion did you reach?
14:49:35 7 A That in a magnitude sense, which is the only
14:49:40 8 sense in which I was interested in comparing it, that they
14:49:43 9 are consistent.
14:49:44 10 Q What does the "15-percent increase" refer to?
14:49:47 11 A I don't recall.
14:49:58 12 Q All right. Let's just go up a little bit
14:50:02 13 higher on the page. "3:10 p.m."
14:50:05 14 Do you see that, and then there's like a
14:50:07 15 little arrow next to it?
14:50:08 16 A Yeah.
14:50:09 17 Q What does it say after that?
14:50:10 18 A It says, "Work on literature regarding
14:50:13 19 Jenkins," I think.
14:50:14 20 Q What work did you do regarding the literature
14:50:17 21 on Jenkins?

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14:50:18 22 A Collected it.
14:50:19 23 Q What literature did you collect?
14:50:21 24 A I think it was a list of publications that I
14:50:25 25 got off of Current Contents.
14:50:27 26 Q Okay. So you spent -- I'm sorry.
14:50:29 27 A Yeah. 35 minutes putting that list together.
14:50:32 28 Q All right. Now, let's look at page 90.

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14:50:42 1 I see a date "7/3/00" for that.
14:50:46 2 A That's correct. Pretty current.
14:50:49 3 Q Just about a week ago.
14:50:53 4 And I see two stars.
14:50:55 5 The second star says "Dr. Ott," O-t-t?
14:50:59 6 A Yes.
14:50:59 7 Q And then there is some indication after
14:51:01 8 that.
14:51:01 9 What does that say after that?
14:51:03 10 A "Used data," question mark.
14:51:04 11 Q What does that mean?
14:51:06 12 A From what I understand is I received some
14:51:14 13 papers that Dr. Ott has published related to environmental
14:51:20 14 tobacco smoke. And I was asked whether there were data in
14:51:24 15 those papers that would be useful to me in providing some
14:51:29 16 support for my opinions.
14:51:31 17 Q Are there any data that is useful to you in
14:51:34 18 providing support for your opinions?
14:51:36 19 A I informed the -- Mr. McGuire's firm that I
14:51:41 20 had used some information from Dr. Ott already and that I
14:51:45 21 didn't think that the materials -- the new materials that
14:51:49 22 they sent me would add significantly to the opinions that
14:51:53 23 I had already prepared.
14:51:58 24 Q Okay. And then I see a reference to -- a
14:52:01 25 couple of lines down. It says -- well, let's just go
14:52:07 26 through them.
14:52:07 27 "E-mail."
14:52:08 28 What does the reference to "e-mail" mean?

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14:52:12 1 A This section was concerned with the materials
14:52:16 2 that were in my files related to this case and the
14:52:21 3 question of what was appropriate to turn over to your
14:52:24 4 firm -- or to the defendants.
14:52:26 5 Q Okay. And "Diary"?
14:52:28 6 A The diary is what we're reviewing right now.
14:52:30 7 Q And then it says "Graphic" with a question
14:52:33 8 mark.
14:52:33 9 What does that mean?
14:52:34 10 A I think it means a question was raised as to
14:52:41 11 whether -- this is no longer in terms of preparing the
14:52:43 12 file. But for future work, the idea of preparing some
14:52:51 13 graphical materials to help convey the conclusions or the
14:52:55 14 opinions that I have, for when this gets to trial.
14:52:59 15 Q All right. And then I see the term
14:53:02 16 "Demonstrative Evidence" beneath that.
14:53:05 17 What is that?
14:53:05 18 A That is the same theme. A graphic would be
14:53:09 19 an example of demonstrative evidence.
14:53:11 20 Q Is there any demonstrative evidence,
14:53:15 21 including graphics, that you intend to prepare for trial?
14:53:19 22 A I think that's likely.
14:53:22 23 Q Are there any that you have in mind, as you
14:53:24 24 sit here today?
14:53:25 25 A No.
14:53:26 26 Q Then the next thing down says -- it's in a

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box --
A Right.

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Q -- and it has stars around it. It says, "Plausible upper bound." And then to the right of that, it says "Send."
Do you see that?
A Yes.
Q What does that mean?
A Well, that's the -- I don't know, the final precipitating event or that note corresponds to the precipitation of this seven-page document that's Exhibit 559.
Q So "Plausible upper bound" refers to your high-range estimates?
A Right. Which turn out, in fact, not to be upper bound, but 90th to 98 percentile. But at the time I made this note, I wasn't thinking very clearly about what I could do.
Q What's the difference between a plausible upper-bound and a high-range estimate?
A Plausible upper bound for 3 million people who are exposed might aim at what the top 10 people get. What I'm aiming is what the top 10, 30, 50, 100,000 people get in terms of their exposure. So the plausible upper bound would be higher than the numbers I've prepared.
MR. McGUIRE: By "higher," you don't mean more people, you mean --
THE WITNESS: No. No. Higher level of exposure.
MR. McGUIRE: Yes.

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When you're -- I have to make a quick phone call, Pat. When you're at a good breaking point, just give me two minutes, and I'll be right back.
MR. CAFFERTY: All right. Let me just ask about one other document.
Would that be okay?
MR. McGUIRE: Sure. That's fine.
MR. CAFFERT: It's related to this one.
MR. McGUIRE: We don't have to take a formal break on this either. I just need to get back on the phone.
MR. CAFFERTY: Let's take a break now. Why don't you go do that.
VIDEOGRAPHER: We are off the record. The time is 2:54.
(Recess.)
VIDEOGRAPHER: We are back on the record. The time is 3 o'clock. This begins Tape 3 of the Volume III deposition of William Nazaroff.
(Exhibit 563 was marked for identification.)
BY MR. CAFFERTY:
Q Dr. Nazaroff, I'm showing you a document that has been marked as Exhibit 563 for purposes of identification.
Could you identify that for the record, please.
A The first two pages of the document are a letter addressed to me from John McGuire dated June 29th,

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2000, and they're Bates stamps numbers PX-WWN-101 and 102. And on the following pages, appear to be the first

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15:01:56 3 pages or perhaps the first few pages of at least several
15:02:00 4 of the documents that are referred to, if not all of them,
15:02:03 5 in the letter.
15:02:03 6 Q All right. Now, before, you were testifying
15:02:09 7 about some data that Wayne Ott had produced.
15:02:17 8 Is -- are the studies that are reflected in
15:02:20 9 Exhibit 563, the Ott data that you were referring to?
15:02:27 10 A I referred to Ott data in two separate
15:02:30 11 contexts, and I'm not sure which one we're talking to --
15:02:33 12 talking about.
15:02:34 13 One is in connection with my diary, the
15:02:39 14 mention of Dr. Ott and information that was sent to me
15:02:43 15 from Mr. McGuire's office. And the other is in my
15:02:46 16 original declaration, I used some of Ott's work.
15:02:50 17 Q Good point.
15:02:51 18 What I meant was the former that you just
15:02:53 19 said, the information that Mr. McGuire sent to you and
15:02:57 20 asked you to consider.
15:02:58 21 A Yes. And that's what is -- this is the cover
15:03:05 22 letter that went along with those materials, yes.
15:03:09 23 Q Okay. Now, are all of the -- I guess there
15:03:15 24 are nine different things that referenced in Mr. McGuire's
15:03:18 25 letter.
15:03:18 26 Are all of those things which you would call
15:03:20 27 the Ott data?
15:03:21 28 A I don't know how to respond to that simply.

15:03:30 1 Ott has published a lot more work than is reflected here.
15:03:34 2 But the reference in my notebook was to this set.
15:03:40 3 Q So all of these -- or each of these nine
15:03:44 4 things that Mr. McGuire sent to you that are referenced in
15:03:47 5 Exhibit 563, are all things that come from Dr. Ott?
15:03:53 6 A Well, in fact, I don't even know whether
15:03:56 7 that's true, without looking at them. But they look like
15:04:02 8 he is an author on all, the lead author on many, the sole
15:04:12 9 author on a few of the documents, yes.
15:04:14 10 Q What relevance, if any, do these studies
15:04:17 11 referenced in Exhibit 563 have to the opinions that you're
15:04:21 12 prepared to offer in this case?
15:04:22 13 MR. McGUIRE: Calls for a legal conclusion.
15:04:24 14 Answer as best you can without any linkage
15:04:29 15 into what relevance means in a legal sense.
15:04:36 16 THE WITNESS: I don't recall -- and I think I
15:04:39 17 did not rely on these studies to form my opinions. So
15:04:44 18 there is no direct bearing.
15:04:48 19 BY MR. CAFFERTY:
15:04:48 20 Q All right. Let's come back now to
15:04:52 21 Exhibit 559, because I want to try to understand how you
15:04:58 22 performed these calculations that are reflected in
15:05:04 23 Exhibit 559.
15:05:05 24 A Right.
15:05:06 25 Q Oh. By the way, on Exhibit 563, one of the
15:05:14 26 things I didn't see on here was one of your little
15:05:18 27 handwritten notations, "received."
15:05:20 28 Is this a document that you actually

15:05:21 1 received?
15:05:22 2 A Yes. And I'm not consistent in that practice.
15:05:24 3 Q Okay. All right. 559.
15:05:32 4 Who prepared Exhibit 559? And let's limit it
15:05:39 5 to pages 1435 through 1438.
15:05:44 6 A I prepared the original.
15:05:47 7 Q Okay. And then 14- -- it looks like there

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15:05:50 8 are some attachments here. 1439 to 1441.
15:05:54 9 What are those attachments?
15:05:57 10 A Those are from a reference that I used for
15:06:02 11 some of the calculations that are reflected in these
15:06:09 12 tables, in the material that I prepared.
15:06:12 13 Q Okay. All right. Now, if you look at page
15:06:17 14 1437, it's entitled "Notes for Tables 1C-1E."
15:06:29 15 Could you just explain briefly which notes go
15:06:32 16 to which parts of the tables?
15:06:34 17 A Sure. The -- it follows pretty much
15:06:42 18 linearly. So if -- this material comprises about a page
15:06:49 19 and a half on page 3 and page 4, page 37 and 38 in the
15:06:54 20 Bates stamp. There are italicized headings that map to
15:07:05 21 Table 1C. So where it says "Back-of-the-envelope
15:07:07 22 calculation," and there are some additional notes, that's
15:07:10 23 information that supports the first line of entries in
15:07:13 24 Table 1C. The Jenkins et al., 1996 entry on page 37
15:07:21 25 supports the Jenkins et al., 1996 entry in Table 1C, and
15:07:27 26 so forth, through Heavner, twice. Through Miller et al.,
15:07:33 27 '98. Through time-dependent exposure modeling, which is
15:07:37 28 listed as Case 1, in Table 1C. And the microenvironmental

15:07:43 1 modeling.
15:07:43 2 The remaining two paragraphs are labeled in
15:07:47 3 italics with tables that they are intended to support,
15:07:51 4 Table 1D and 1E.
15:07:53 5 Q Okay. So then with that explanation, would
15:07:56 6 it be fair to say that the items listed under
15:07:59 7 "Back-of-the-envelope calculation" under -- on page 1437,
15:08:06 8 only relate to your back-of-the-envelope calculation --
15:08:13 9 calculations.
15:08:15 10 A To the extent I understand that question, yes.
15:08:17 11 Q Okay. All right. Let's talk first about the
15:08:24 12 back-of-the-envelope calculation. And first is your --
15:08:27 13 well, actually, let's start by looking at the Table 1C.
15:08:32 14 And under the heading "method," which is all
15:08:35 15 the way on the left side, I see -- I see six different
15:08:48 16 italicized headings, starting with "back-of-the-envelope
15:08:54 17 calculation," down to "overall summary."
15:08:56 18 What do those italicized headings reference?
15:09:00 19 A Well, "overall summary" is not part of the
15:09:03 20 same set, even though the formatting suggests that it
15:09:06 21 might be. The other five are, in fact, the methods. And
15:09:10 22 these map one to one to my original declaration. Those
15:09:17 23 same five methods were used in the original work.
15:09:19 24 Q Okay. So Method 1 would be
15:09:21 25 back-of-the-envelope calculation, correct?
15:09:23 26 A Yes.
15:09:23 27 Q Method 2 would be personal and
15:09:25 28 microenvironmental monitoring, correct?

15:09:28 1 A Yes.
15:09:28 2 Q And it looks to me like you have five
15:09:31 3 different ways of looking at the personal and
15:09:36 4 microenvironmental monitoring, depending on which study
15:09:40 5 you're using; is that right?
15:09:40 6 A That's correct. Although, one of them was
15:09:43 7 not usable for this purpose, even though I used it in the
15:09:47 8 original declaration. That's the Ozkaynak et al.
15:09:50 9 Q I'll come back and ask you about that because
15:09:53 10 I want to understand why you couldn't use that.
15:09:55 11 Then the third category is biomarker of ETS
15:09:59 12 exposure. I only see one study under that, this Pirkle

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15:10:02 13 study.
15:10:03 14 A That's correct.
15:10:03 15 Q And that's the same as what you did the first
15:10:05 16 time? You only had Pirkle, right?
15:10:07 17 A That's right.
15:10:08 18 Q And likewise for No. 2, you only had the five
15:10:10 19 studies that you list under "personal and
15:10:12 20 microenviromental monitoring," correct?
15:10:15 21 A That's correct.
15:10:16 22 Q And then No. 4 is "time-dependent modeling of
15:10:19 23 exposure."
15:10:19 24 And there's one thing listed under that, Case
15:10:21 25 1?
15:10:21 26 A Yes.
15:10:22 27 Q As I recall, you had a Case 1 and a Case 2 --
15:10:25 28 A That's right.

15:10:26 1 Q -- in your first modeling.
15:10:29 2 What happened to Case 2 in this calculation?
15:10:32 3 A Case 2 was designed to estimate average
15:10:36 4 exposures. So it wasn't appropriate, in my opinion, as a
15:10:41 5 foundation for making a high-end exposure estimate.
15:10:45 6 Q So you deleted Case 2 from this
15:10:50 7 consideration?
15:10:51 8 A I did not include it, yeah.
15:10:52 9 Q All right. And then the fifth one is
15:10:55 10 "microenvironmental modeling," and I see one study
15:10:59 11 referenced under that.
15:11:00 12 Is that how many studies you referenced the
15:11:02 13 first time, is just that one study?
15:11:03 14 A Yes.
15:11:03 15 Q Then I see "overall summary."
15:11:06 16 You have a median, a mean, and a range?
15:11:08 17 A Correct.
15:11:09 18 Q All right. Is that what you had the first
15:11:11 19 time you did your calculations? You can refer back to
15:11:14 20 your --
15:11:15 21 A Yes.
15:11:15 22 Q -- declaration. I think it was Exhibit 27.
15:11:18 23 A Originally, I just had a median and a range
15:11:29 24 in the original declaration.
15:11:31 25 Q Okay. What is the significance of putting a
15:11:33 26 mean in this new calculation?
15:11:40 27 A Another piece of statistical information that
15:11:46 28 reinforces the approximate validity of the median.

15:11:51 1 Q Okay. All right. Now, the middle column is
15:11:54 2 headed "exposure," and then it says, paren, "cig ets/day,"
15:12:01 3 close paren.
15:12:02 4 What does that reference?
15:12:03 5 MR. McGUIRE: Cumulative.
15:12:06 6 You can go ahead and answer.
15:12:11 7 THE WITNESS: Okay. The metric that I'm
15:12:16 8 using in this table for assessing exposure is the same one
15:12:21 9 that I developed in the original declaration. So once --
15:12:26 10 we spent a fair amount of time, I recall, talking about
15:12:29 11 this in the original deposition.
15:12:30 12 But just to refresh the story, one "cig ets
15:12:34 13 per day" would imply that the person being considered, the
15:12:39 14 exposure, would cause or have associated with it all of
15:12:46 15 the smoke, pollutants produced by smoking one cigarette
15:12:52 16 over a course of a 24-hour period.
15:12:55 17 BY MR. CAFFERTY:

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15:12:58 18 Q Okay. So for this first one, just so that
15:13:01 19 we're clear on the concept, to make sure that it is the
15:13:04 20 same concept that we discussed in detail last year, .33
15:13:09 21 would mean that you're going to get -- that the person
15:13:11 22 exposed is going to breathe one third of the total amount
15:13:16 23 of ETS that comes from one cigarette?
15:13:19 24 A That is correct.
15:13:20 25 Q Okay.
15:13:20 26 A In a day's time.
15:13:22 27 Q In a day's time.
15:13:23 28 A Yeah.

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15:13:23 1 Q All right. So that's one third --
15:13:25 2 A Only considering exposure in the residence.
15:13:28 3 I mean, I think we understand the caveats around this,
15:13:30 4 but, yes.
15:13:30 5 Q All right. Now what I want to try to
15:13:32 6 understand is how you did this calculation, the
15:13:34 7 calculations referenced on this table. And I'd like, in
15:13:38 8 doing that, to use Table 1C and then to use the notes that
15:13:42 9 appear on 1437 and make sure that I understand how the
15:13:47 10 notes link up with the table.
15:13:48 11 A May I, for the purposes of the question, take
15:13:52 12 this thing apart so that I've got both of them side by
15:13:55 13 side?
15:13:55 14 Q Oh, absolutely. Then we'll reattach them
15:13:58 15 when we're done.
15:13:59 16 A Good. We're high tech.
15:14:02 17 Q In fact, since you're doing that, I'll do it
15:14:04 18 too.
15:14:05 19 MR. McGUIRE: The record should reflect that
15:14:09 20 I am not doing it.
15:14:10 21 BY MR. CAFFERTY:
15:14:10 22 Q All right. Let's talk about the back-of-the-
15:14:20 23 envelope calculation -- oh, there's a last column here,
15:14:24 24 "note," on Table 1C.
15:14:26 25 What does that "note" column represent?
15:14:27 26 A That is a -- some explanatory note or a
15:14:32 27 comment about the calculation or about the result that
15:14:37 28 kind of helps place it in some context, understand what I

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15:14:40 1 was trying to accomplish with the calculation.
15:14:42 2 Q All right. Now, if you could just briefly
15:14:44 3 describe for me how you did the calculation under the
15:14:48 4 back-of-the-envelope calculation method.
15:14:52 5 A Right.
15:14:52 6 Q And it's the calculation reflected in Table
15:14:55 7 1C.
15:14:56 8 A That calculation is built upon an equation
15:15:02 9 that appears in my original declaration. And I should say
15:15:07 10 for clarity that the methods that I'm using here parallel
15:15:13 11 directly the methods that were employed in my original
15:15:17 12 declaration. So I'm just applying those methods to try to
15:15:21 13 estimate a high-end exposure instead of the average
15:15:24 14 exposure.
15:15:24 15 In the back-of-the-envelope calculation in my
15:15:31 16 original declaration -- can I refer to it by page number?
15:15:35 17 Q Sure.
15:15:35 18 A Page 37 --
15:15:36 19 Q Page 37.
15:15:37 20 A -- Equation 3 gives the exposure estimate
15:15:42 21 calculation in terms of units of cigarettes per ETS per
15:15:49 22 day. So the left-hand side is the exposure in cigs ETS

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15:15:55 23 per day. And the right-hand side is how I'm calculating
15:15:58 24 it, by finding parameters for the variables that are in
15:16:01 25 place there.
15:16:02 26 Q Okay.
15:16:04 27 A In doing a median estimate, as I did in the
15:16:09 28 original declaration, I took central estimate values for

15:16:13 1 the various parameters that are in that equation. For
15:16:18 2 obtaining a high-end exposure estimate, I used high-end
15:16:24 3 values. But I actually did -- I mean, that's the
15:16:27 4 concept. I executed it in a little bit different way than
15:16:31 5 that. The -- and that's what the notes on Bates No. 1437
15:16:38 6 elaborate on.
15:16:39 7 The calculation involved first determining an
15:16:49 8 estimate of the geometric mean, value of 'X' over 'E,' and
15:16:55 9 then figuring out what two standard deviations above that
15:16:59 10 geometric mean would be.
15:17:01 11 Q All right. So let's stop there and look at
15:17:04 12 the note. It says "average of low range" -- and this is
15:17:07 13 the note in Column 3 of Table 1C in Exhibit 559.
15:17:13 14 A Right.
15:17:13 15 Q It says "average of low range and high
15:17:16 16 range." It says approximately 2.
15:17:18 17 That Greek symbol is sigma, correct?
15:17:21 18 A Correct.
15:17:22 19 Q "2 sigma above mean, lognormal."
15:17:26 20 A Right.
15:17:26 21 Q What does that mean?
15:17:27 22 A It means that the calculation was done
15:17:29 23 assuming that the parameters on the right-hand side are
15:17:35 24 lognormally distributed with the -- of Equation 3. With
15:17:40 25 the exception of the 'B' over 'H' value for which I assume
15:17:43 26 constant parameters.
15:17:45 27 If, as in this equation, one multiplies
15:17:54 28 independent lognormally distributed parameters together,

15:17:57 1 the resulting parameter that comes from that calculation
15:18:01 2 is also lognormally distributed. It has geometric means
15:18:05 3 and geometric standard deviations that are -- that can be
15:18:09 4 calculated from the geometric mean and geometric standard
15:18:13 5 deviation of the parent variables.
15:18:15 6 So it was that approach that I used, then, to
15:18:18 7 carry out this calculation.
15:18:20 8 Q Now, it's important, since we're dealing with
15:18:22 9 lawyers and judges in this case, to try to put this stuff
15:18:25 10 in simple terms --
15:18:26 11 A Yes.
15:18:27 12 Q -- so that us lawyers and the judge can
15:18:30 13 understand it. And I think what you just said is going to
15:18:32 14 be a little difficult for anyone to understand in this
15:18:35 15 case.
15:18:36 16 Can you put that in simpler terms?
15:18:38 17 A Well, in simpler terms, but -- and this
15:18:41 18 captures the spirit of what I did, but not the mechanics.
15:18:46 19 I took this equation, and I applied it using values of the
15:18:55 20 parameters that would tend to cause higher than average
15:18:59 21 exposure conditions. Where the values of the parameters
15:19:03 22 were selected from measured data for those parameters,
15:19:07 23 such that the result gives me an estimate of what the 95th
15:19:12 24 percentile of the distribution or the 97th percentile of
15:19:19 25 the distribution would look like.
15:19:21 26 Q What is the difference between the parameters
15:19:22 27 you used for your back-of-the-envelope calculation

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15:19:25 28 reflected in your declaration, Exhibit 27, and the

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15:19:29 1 parameters that you used in performing the calculations
15:19:33 2 reflected in Exhibit 559 for the back-of-the-envelope
15:19:38 3 calculation?
15:19:39 4 A In the original declaration, I used values
15:19:49 5 that were intended to represent central tendencies. So I
15:19:53 6 selected geometric mean values or median values.
15:19:56 7 For example, for the air exchange rate, I
15:20:00 8 used .62 air changes per hour. In this calculation, I did
15:20:07 9 not select a specific value, but I took into account the
15:20:12 10 fact that there is a distribution of air exchange rates in
15:20:17 11 the housing stock. And there are some houses that may
15:20:20 12 have an air -- or do have an air exchange rate of only .3
15:20:25 13 per hour, not of .62. All else being unchanged, living in
15:20:31 14 a house with a lower air exchange rate leads to a higher
15:20:34 15 exposure.
15:20:35 16 So I used a statistical approach to transform
15:20:38 17 that variability in the input parameters into an estimate
15:20:43 18 of the variability or the consequence of that variability
15:20:45 19 for the output.
15:20:46 20 Q Let's see if we might be able to do this in
15:20:49 21 a simpler way.
15:20:50 22 Let's go back to your -- because I know it's
15:20:53 23 hard for you to dummy down to us to explain it to us, and
15:20:56 24 it's hard for us to understand in the terms that you
15:20:59 25 ordinarily speak in.
15:21:00 26 A I understand that.
15:21:01 27 Q So let's see if we can kind of meet in the
15:21:03 28 middle.

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15:21:04 1 Let's go back to your equation, which is on
15:21:09 2 page 37 of Exhibit 27. 'X' divided by 'E' equals 'B'
15:21:13 3 times 'N' divided by 'H' times 'V' times 'A.'
15:21:16 4 'X' divided by 'E' is the number that you
15:21:18 5 want to come up with, correct?
15:21:21 6 A Correct.
15:21:22 7 Q And what does 'X' represent in that?
15:21:24 8 A 'X' is exposure --
15:21:25 9 Q All right.
15:21:26 10 A -- to a particular constituent in tobacco
15:21:29 11 smoke.
15:21:29 12 Q And 'E,' what does that represent?
15:21:30 13 A That's an emission factor for that
15:21:33 14 constituent.
15:21:33 15 Q All right. Now, does the 'E' change in your
15:21:36 16 calculations?
15:21:37 17 A Not in this section of the calculations.
15:21:41 18 That is, in Table 1C, it's that ratio 'X' over 'E' that
15:21:46 19 I'm looking for. Not specifically 'X' or 'E.'
15:21:49 20 Q All right. So is -- what does 'B' represent
15:21:54 21 in the calculation?
15:21:54 22 A 'B' is the amount of indoor air that is
15:22:02 23 inhaled by a nonsmoker who is exposed.
15:22:06 24 Q All right. And what was the -- does the
15:22:11 25 value -- is the value of 'B' that you used in your
15:22:14 26 original calculations reflected in Exhibit 27, the same as
15:22:19 27 the 'B' that you used in these high-range calculations?
15:22:22 28 A Yes.

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15:22:22 1 Q Okay. And what is that number?
15:22:24 2 A That number corresponds to 20 cubic meters
15:22:32 3 per day for an adult.

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15:22:33 4 Q All right. Now, are you assuming in your
15:22:35 5 back-of-the-envelope calculation that the adult breathes
15:22:41 6 all 20 cubic meters from the indoor air space?
15:22:44 7 A No.
15:22:44 8 Q How much are you assuming?
15:22:46 9 A That number appears in the first part of this
15:22:52 10 note, the 6.9 cubic meters. That's indoor air.
15:22:56 11 Q And did you use 6.9 cubic meters for your
15:23:00 12 calculations in Exhibit 27 and the same in Exhibit 559?
15:23:08 13 A Yes. With sort of a qualification. If we
15:23:12 14 turn to page 39, Table 9, you'll see a high-range and a
15:23:18 15 low-range estimate for back-of-the-envelope calculations.
15:23:21 16 And you'll see on the left-hand side, the various
15:23:24 17 parameters that appear as the first five rows.
15:23:27 18 Q Yes.
15:23:27 19 A And then the last row is the result. And in
15:23:35 20 the low-range and the high-range estimates, you'll see
15:23:39 21 different entries for 'B.' 9.9 cubic meters for the low
15:23:43 22 range and 6.9 cubic meters for the high range.
15:23:46 23 The -- that, I think answers the question.
15:23:55 24 Q All right. Now, so your high-range number
15:23:57 25 was 6.9 cubic meters --
15:24:00 26 A Right.
15:24:00 27 Q -- in your initial calculations?
15:24:02 28 A Right.

15:24:02 1 Q And the number that you used in your high
15:24:14 2 range was 6.9 cubic meters, correct?
15:24:23 3 A Same value.
15:24:24 4 Q All right. Did you use --
15:24:24 5 THE REPORTER: We're starting to overlap, and
15:24:24 6 this is a bad spot to do it.
15:24:24 7 MR. CAFFERTY: Sorry.
15:24:24 8 THE REPORTER: If you want to repeat on your
15:24:24 9 question, "the number that you used" --
15:24:24 10 BY MR. CAFFERTY:
15:24:24 11 Q For your calculations on Exhibit 559 was also
15:24:26 12 6.9 cubic meters; correct?
15:24:26 13 A That's correct -- well, it's -- I ended up
15:24:28 14 doing both the high-range and the low-range calculations.
15:24:31 15 So when I did a high-range calculation, I used 6.9 cubic
15:24:35 16 meters. And when I did the low-range calculation, I used
15:24:39 17 the 9.9 number.
15:24:41 18 Q Did you do a low-range calculation for your
15:24:43 19 high-range estimates reflected in Exhibit 559?
15:24:47 20 A Now we're running into confusion between the
15:24:56 21 variability and the uncertainty that I'm trying to use to
15:25:00 22 bound this.
15:25:01 23 The purpose of doing a low-range and a
15:25:04 24 high-range estimate for the back-of-the-envelope
15:25:06 25 calculation was to approximately bracket the -- what I
15:25:10 26 think the true number is.
15:25:11 27 I did that same thing for the high-range
15:25:17 28 exposure estimate. But I'm running out of words here.

15:25:20 1 High range there refers to individuals who are exposed at
15:25:24 2 above average. So I did both an upper-bound and a
15:25:29 3 lower-bound calculation, trying to estimate that -- that
15:25:33 4 value. And what I reported here, the .33, is the average
15:25:37 5 of those two numbers.
15:25:38 6 MR. McGUIRE: So the answer to his question
15:25:39 7 was yes, you did use a 6.9?
15:25:42 8 THE WITNESS: I did use 6.9, and I also used

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15:25:46 9 9.9.
15:25:46 10 MR. McGUIRE: So you used both. Thank you.
15:25:48 11 BY MR. CAFFERTY:
15:25:49 12 Q So where it says here back-of-the-envelope
15:25:52 13 calculation on page 1437, 'B' divided by 'H.'
15:25:57 14 And 'B' is the amount of air that the person
15:25:59 15 breathes, right?
15:26:00 16 A Correct.
15:26:00 17 Q 'H' is the number of hours that they breathe
15:26:03 18 it. And then 'B' divided by 'H' equals 6.9 cubic meters
15:26:08 19 per 8 hours equals 0.86 cubic meters per hour, constant.
15:26:14 20 You actually had two constants, then; is that
15:26:16 21 right?
15:26:17 22 A That's correct. And the notes are inaccurate
15:26:20 23 in not reflecting that. There should be a second entry
15:26:24 24 that says 9.9 divided by 24.
15:26:28 25 Q Okay. Now, the number of hours, the 'H,'
15:26:31 26 did that change, or was 8 hours used for both the
15:26:34 27 low-range and high-range calculations for purposes of
15:26:38 28 Exhibit 559, back-of-the-envelope calculation?

15:26:42 1 A I think you misstated what my intent is with
15:26:46 2 'H' in the previous question. So let me, if I may, go
15:26:51 3 back and clarify what I mean by 'H.'
15:26:53 4 Q Please.
15:26:53 5 A 'H' represents the volume -- not the duration
15:26:57 6 of time that a nonsmoker is exposed, but, rather, the
15:27:03 7 volume of -- or the period over which ventilation air into
15:27:07 8 the building serves to dilute environmental tobacco smoke
15:27:12 9 emissions.
15:27:12 10 So when I use a value of 8 hours, what I am
15:27:17 11 assuming is that all of the cigarettes are smoked during
15:27:20 12 some 8-hour period, you know, when the smokers are at home
15:27:24 13 from work and everybody is awake.
15:27:25 14 Q Okay.
15:27:26 15 A And that the concentrations, then, are
15:27:30 16 somewhat higher than they would be for the 24-hour average
15:27:33 17 period.
15:27:34 18 When I use the 24-hour average period, I'm
15:27:37 19 basically saying let's take all the air that passes
15:27:39 20 through a residence in the course of one day and dilute
15:27:41 21 all of the cigarette smoke into that air and use that to
15:27:45 22 estimate the concentrations.
15:27:47 23 Q Did you only use 8 hours as that value?
15:27:51 24 A I used both 8 and 24, as I had done in the
15:27:55 25 original declaration.
15:27:55 26 Q All right. So then your second constant
15:27:58 27 would be 9.9 cubic meters divided by 24 hours?
15:28:02 28 A That's correct.

15:28:03 1 Q And that would yield -- would that yield a
15:28:06 2 lower constant, or a higher constant?
15:28:09 3 A That would yield a lower value. That's the
15:28:12 4 lower range estimate, lower bound.
15:28:14 5 Q Okay. 'N.'
15:28:15 6 What is 'N'?
15:28:16 7 A 'N' is the number of cigarettes smoked per
15:28:20 8 day indoors in the residence.
15:28:24 9 Q All right. And then I see "N equals
15:28:27 10 lognormal distribution with GM."
15:28:31 11 This is in your notes for Table 1C on page
15:28:34 12 1437.
15:28:35 13 Could you explain what that means?

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15:28:38 14 A Yes. It's the same -- the same result that I
15:28:46 15 used or same information that was presented in the
15:28:49 16 original declaration. And what I have assumed in this
15:28:52 17 calculation is that the number of cigarettes smoked in a
15:28:57 18 residence is lognormally distributed. And that lognormal
15:29:03 19 distribution has a geometric mean of 11.8 cigarettes per
15:29:08 20 day and the geometric standard deviation of 2.35.
15:29:13 21 Q All right. So then for your low-range
15:29:17 22 number, what did you use for your value of 'N'?
15:29:20 23 A This is where we got stuck the last time we
15:29:24 24 tried to approach this. The -- I did not make a
15:29:31 25 calculation for this back-of-the-envelope approach in
15:29:35 26 which I took specific values of 'V,' 'N,' and 'A.'
15:29:45 27 THE REPORTER: 'V,' 'N and 'A'?
15:29:45 28 THE WITNESS: Yes.

15:29:45 1 Rather, I used a statistical approach that
15:29:49 2 says if you multiply lognormally distributed -- multiply
15:29:54 3 or divide lognormally distributed parameters together, the
15:29:59 4 result is also lognormally distributed with a geometric
15:30:03 5 mean and with a geometric standard deviation that can be
15:30:06 6 computed from the parameter -- those parameters in the
15:30:11 7 parent variables. So I just made those computations. I
15:30:14 8 didn't take specific values of 'V,' 'N' or 'A.' I applied
15:30:19 9 really what is a standard equation for propagating
15:30:23 10 variability through a governing equation or an equation
15:30:29 11 that combines variables.
15:30:30 12 BY MR. CAFFERTY:
15:30:30 13 Q You're right. This is a hard concept.
15:30:33 14 In terms of the number of cigarettes -- well,
15:30:39 15 let's stop here for a minute.
15:30:40 16 What does 'V' represent?
15:30:42 17 A 'V' is the volume of the residents.
15:30:44 18 Q Okay. And is the 'V' that you used in your
15:30:48 19 high-range calculations reflected in 559, the same as the
15:30:55 20 'V' that you used in your original calculations?
15:30:58 21 A Well, you can see there -- from the entry,
15:31:01 22 there is a small discrepancy. But it's really of -- not
15:31:05 23 of consequence. I used a geometric mean of 310 and a
15:31:10 24 geometric standard deviation of 1.78 for the high-range
15:31:14 25 calculation. In the original declaration, I used a fixed
15:31:18 26 value of 300 cubic meters. So the difference here, it
15:31:23 27 would be between 300 and 310.
15:31:26 28 Q Why is there a difference?

15:31:28 1 A Oh, it wasn't intentional. And because it's
15:31:31 2 only three percent, I think it's irrelevant or immaterial.
15:31:35 3 Q Okay. So that's just a mistake in your
15:31:38 4 calculation? Were you intending to use 300 and keep it
15:31:41 5 the same as what you had used before?
15:31:43 6 A No. I was intending to reflect what appears
15:31:49 7 in a discussion in the original declaration as to the
15:31:52 8 volume of residential buildings in the United States. And
15:32:03 9 it -- it's likely the case that 300 represents a -- well,
15:32:13 10 actually, I'm not sure now. 300 might be a rounding.
15:32:19 11 The source of the 310 geometric mean and 1.78
15:32:48 12 geometric standard deviation, I believe, is the report
15:32:54 13 that is cited as Miller et al., 1998. 1998b.
15:33:05 14 Q Okay. All right. Well, I'm not as concerned
15:33:09 15 with the source as I am in the differences between what
15:33:12 16 you did in this new calculation in 559 --
15:33:17 17 A Right.
15:33:18 18 Q -- and what you did in the old one in

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15:33:20 19 Exhibit 27. That's really what I'm trying to get at right
15:33:24 20 now.
15:33:24 21 So what is 'A' in this calculation?
15:33:27 22 A 'A' is the air exchange rate.
15:33:29 23 Q All right. And that's -- for this one, it
15:33:32 24 says .62 air exchanges per hour? So it's less than one
15:33:39 25 per hour?
15:33:39 26 A Yes.
15:33:39 27 Q And it looks to me like that's the same as
15:33:43 28 what you used in your initial calculation.

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15:33:45 1 A The geometric mean for the distribution that
15:33:48 2 I'm considering in the new calculation is the same as the
15:33:51 3 fixed value that I used in the original calculations.
15:33:56 4 Q Did you use a different standard deviation
15:33:58 5 for this calculation, for the 'A' value?
15:34:01 6 A In the back-of-the-envelope calculation,
15:34:04 7 since I was interested in estimating the central value, I
15:34:07 8 didn't consider -- I didn't use a standard deviation at
15:34:11 9 all. I took a central estimate, in this case, the
15:34:14 10 geometric mean, and didn't allow for any variability.
15:34:17 11 Q Okay. And how about in the high-range
15:34:19 12 calculations reflected in Exhibit 559, is that what you
15:34:23 13 did there too?
15:34:24 14 A No. The high-range calculations explicitly
15:34:28 15 incorporate information about the variability. So they
15:34:31 16 use the geometric standard deviation.
15:34:34 17 Q So that's a difference between what you did
15:34:36 18 the first time and what you did the second time?
15:34:38 19 A Yeah.
15:34:38 20 Q You used a standard deviation which you
15:34:41 21 didn't use the first time?
15:34:42 22 A Right. I'm looking at -- statistically, that
15:34:46 23 portion of the population or that portion of the -- in
15:34:50 24 this case, the housing stock where the ventilation rates
15:34:54 25 are lower than average, the building volume is smaller
15:34:59 26 than average, the number of cigarette smoke indoors may
15:35:04 27 be -- or is higher than average. And those factors put
15:35:08 28 together lead to higher levels of residential exposure.

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15:35:12 1 Q Okay. All right. So with the 'V' and the
15:35:17 2 'G' -- the standard deviations that you used, does the 'V'
15:35:23 3 become smaller than 300, in your high-range calculation?
15:35:30 4 A The -- in -- all -- more likely than not,
15:35:40 5 yes. But, again, because the calculation is not done by
15:35:47 6 selecting a specific value of 'V.' It's a manipulation of
15:35:51 7 probability distributions. This result doesn't correspond
15:35:55 8 to a specific value or I didn't use a specific value of
15:36:00 9 'V' to get to this exposure.
15:36:02 10 Q Right. All right.
15:36:05 11 Now, how did you determine the value that you
15:36:08 12 used for 'N' -- the geometric mean for the value of 'N'
15:36:15 13 that you used in this case?
15:36:17 14 A Those numbers, the geometric mean and the
15:36:23 15 geometric standard deviation, come from my group's
15:36:28 16 analyses of the questionnaire data published in -- it was
15:36:39 17 work conducted by the California Air Resources Board or
15:36:43 18 funded by them in the early part of the 1990s, published
15:36:46 19 as Wiley et al., and Jenkins et al. And that information
15:36:51 20 is cited and, in fact, discussed in my original
15:36:54 21 declaration.
15:36:54 22 Q All right. For purposes of this calculation,
15:36:56 23 which values did you select for 'N'?

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15:36:59 24 A It's the same issue as with the --
15:37:05 25 MR. McGUIRE: Maybe this is just semantic.
15:37:08 26 Let me just stop you.
15:37:09 27 He's saying which ones did you select? You
15:37:12 28 said five times I didn't select. But you calculated

15:37:15 1 something that resulted in a number, right?
15:37:16 2 THE WITNESS: Not -- I calculated something
15:37:19 3 that produced a result.
15:37:20 4 MR. McGUIRE: Okay.
15:37:21 5 THE WITNESS: And that result could be
15:37:22 6 produced by a value -- I mean, let me just give you an
15:37:26 7 example without -- I'll give you numbers, but the numbers
15:37:30 8 aren't intended to be exactly correct. They're only
15:37:32 9 intended to illustrate --
15:37:36 10 BY MR. CAFFERTY:
15:37:36 11 Q Sure.
15:37:36 12 A -- the situation.
15:37:38 13 Let's take, for example, the situation where
15:37:47 14 we only allow 'N' and 'V' to vary, and assume that 'A' is
15:37:54 15 fixed. So 'A' would be .62 air changes per hour. 'B'
15:37:58 16 over 'H' is fixed. And 'N' and 'V' are variably
15:38:03 17 distributed in the population.
15:38:04 18 Then I can get the same value of 'X' over 'E'
15:38:10 19 if 'N' doubles and 'B' doubles at the same time. So if I
15:38:19 20 report a value of 'X' over 'E,' I may not be able to tell
15:38:22 21 you, you know, what specific value of 'V' did that come
15:38:26 22 from. I could get it from any of a number of values of
15:38:30 23 'V' if the other parameters that are variable had
15:38:35 24 corresponding values that produce the same result.
15:38:39 25 So this particular calculation was not
15:38:46 26 designed and wasn't carried out by selecting specific
15:38:51 27 values. It was carried out by doing a calculation that's
15:38:56 28 based on properties of distributions and manipulating the

15:39:02 1 distributions of parent variables into -- in this equation
15:39:08 2 that I've derived.
15:39:11 3 Q All right. Let's try it a different way.
15:39:17 4 Is the only difference between your low-range
15:39:19 5 and high-range calculations that you averaged to come up
15:39:24 6 with your high-range average number --
15:39:26 7 A Yes.
15:39:27 8 Q -- the 'B' divided by 'H'?
15:39:29 9 A Yes.
15:39:29 10 Q Okay. So the 'V,' 'N,' and 'A' are the same
15:39:33 11 for both the low range and the high range?
15:39:35 12 A That's correct.
15:39:36 13 Q Okay. All right. Now let's talk about the
15:39:41 14 note that says, "28 percent of adolescents living with
15:39:44 15 smoker have 2 or more smokers in household."
15:39:47 16 Do you see that on page 1437?
15:39:49 17 A Yes.
15:39:50 18 Q All right. What's the basis for that
15:39:52 19 statement?
15:39:53 20 A The indirect citation, the place where I got
15:39:59 21 that number, was from Miller et al., 1998b. And the
15:40:04 22 original source of the information was a study, I believe,
15:40:09 23 by Pierce et al. It's cited in Miller. And it was a
15:40:14 24 survey of exposures of Californian juveniles, I think --
15:40:21 25 actually, specifically adolescents, to environmental
15:40:26 26 tobacco smoke. The prevalence of exposure. So it's a
15:40:33 27 questionnaire result.
15:40:34 28 Q How old is that data?

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15:40:35 A The study was carried out in the 1990s.
15:40:38 Q Okay. Then it says, "For upper-range
15:40:41 estimate, use 2 smokers, each smoking 50 percent of their
15:40:46 cigarettes indoors at home. Approximately same as 1
15:40:51 smoker smoking all of their cigarettes indoors at home."
15:40:54 What does that mean?
15:40:55 A Since I'm aiming at people who are at the
15:41:01 high end of the distribution, in the top 5 percent or 10
15:41:04 percent, something like that, and this evidence for
15:41:09 adolescents suggest a high proportion -- much higher
15:41:14 proportion than that 5 or 10 percent, live with two
15:41:17 smokers. I think that -- it's my opinion that for the
15:41:20 high-range exposure estimate, it's appropriate to consider
15:41:24 situations where there are multiple smokers in the home.
15:41:27 In the situation where there are multiple
15:41:32 smokers in the home, of course, more cigarettes would be
15:41:35 smoked on average indoors than if there were a single
15:41:38 smoker. And consistent with the spirit of the
15:41:42 back-of-the-envelope calculation, I've approximated the
15:41:45 situation with two smokers, each at home for half of their
15:41:50 awake hours, as though it were a single smoker who was
15:41:56 smoking indoors at home all of their cigarettes in a day.
15:41:59 Q All right. So how many cigarettes did you
15:42:02 assume were being smoked indoors at home?
15:42:05 A The number comes from the -- I mean, this is
15:42:07 a distribution with a geometric mean of 12 cigarettes per
15:42:11 day and a geometric standard deviation of 2.35.
15:42:16 Q All right. And with a geometric standard

15:42:18 deviation of 2.35 and using the 2 sigma approach, what
15:42:24 does that become?
15:42:25 A Well, I could say, for example, that a 97th
15:42:29 percentile estimate one could obtain by multiplying 11.8
15:42:36 times 2.35 squared. Roughly, that's two or two and a half
15:42:42 packs a day, smoked indoors at home.
15:42:44 Q So 40 to 45 cigarettes smoked indoors at home
15:42:48 in a single day?
15:42:49 A Right. But that would be the 97th percentile
15:42:56 just of that parameter. It's not necessary for the
15:42:58 distribution to -- of 'X' over 'E' to reach 97th
15:43:03 percentile for that specific value of 'N' to occur.
15:43:06 So if, for example, 30 cigarettes were smoked
15:43:10 indoors at home in a day, but the house had a lower air
15:43:14 exchange rate than average or a smaller volume than
15:43:18 average, it could still produce an 'X' over 'E' value
15:43:22 that's as high as I've estimated.
15:43:27 Q Okay. The next note says, "Variance in log
15:43:32 of (X/E) is sum of variances in log of (V) plus log of (N)
15:43:39 plus log of (A)."
15:43:41 Could you just explain in simple terms what
15:43:43 that means.
15:43:44 A That's the equation that I used to carry out
15:43:49 this calculation in words.
15:43:50 When a parameter is lognormally distributed,
15:43:56 that means that the log rhythm of that parameter is
15:43:59 normally distributed and the variance -- the variance is
15:44:11 the square of the standard deviation.

15:44:14 THE REPORTER: The variance is the square?
15:44:16 THE WITNESS: Square of the standard
15:44:17 deviation.
15:44:17 When you add normally distributed variables,

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15:44:19 5 if those variables are independent, the variance of the
15:44:25 6 result is equal to the sum of the variances of the
15:44:28 7 independent variables.
15:44:30 8 So it's -- it's a theorem or a principle from
15:44:36 9 statistics that I've applied here, and, really, I think
15:44:39 10 for a statistician, what would be considered a
15:44:41 11 straightforward matter.
15:44:43 12 Q All right. Then it says, "Therefore, GSD of
15:44:46 13 X/E is about 3.5."
15:44:50 14 What does that mean?
15:44:50 15 A That's the result of that calculation.
15:44:52 16 Q So the sum of the variances in the log of
15:44:57 17 'V,' plus the log of 'N,' plus the log of 'A' --
15:45:00 18 A Produces a GSD. There's another calculation
15:45:06 19 that follows directly.
15:45:08 20 The variance in the log of 'V,' for example,
15:45:15 21 is obtained by taking the log rhythm of the GSD and
15:45:19 22 squaring it, the GSD for 'V.'
15:45:21 23 So, for example, that's 1.78. Take the log
15:45:26 24 rhythm of that and square it, and you have the variance in
15:45:30 25 the log of 'V.' Repeat that for 'N' and for 'A.' Add
15:45:36 26 those results. That's the variance in 'X' over 'E.'
15:45:40 27 Then we take the square root to get back to
15:45:44 28 the standard deviation and exponentiate it if we use

15:45:50 1 natural log rhythms to get the GSD. So that calculation
15:45:54 2 leads to the result 3.5.
15:45:57 3 Q Did you exponentiate it in this case?
15:46:00 4 A Yes.
15:46:00 5 Q All right. Now, it says, "Two standard
15:46:03 6 deviations above mean is 3.5."
15:46:06 7 And I think that's squared, right?
15:46:07 8 A That's correct.
15:46:08 9 Q "Or about 12 times mean."
15:46:10 10 What does that mean?
15:46:11 11 A 3.5 squared equals 12.
15:46:15 12 Q Right.
15:46:16 13 A And in lognormally distributed variables --
15:46:21 14 well, let me go back.
15:46:22 15 In a normally distributed variable, we know
15:46:26 16 that the 50th percentile equals the -- it's the median of
15:46:32 17 the distribution, and it's also the mean of the
15:46:36 18 distribution, that the 68 percent of the distribution lies
15:46:44 19 within one standard deviation plus or minus from the mean,
15:46:49 20 and that 95 percent of the distribution lies within two
15:46:52 21 standard deviations of the means.
15:46:54 22 So that's the basis for these 95 percent
15:46:57 23 confidence intervals, for example.
15:46:58 24 In a lognormally distributed variable, the
15:47:07 25 general behavior is much the same, but instead of adding
15:47:11 26 and subtracting standard deviations, we multiply and
15:47:14 27 divide by geometric standard deviations.
15:47:18 28 So in a lognormally distributed variable, the

15:47:24 1 median equals the geometric mean. The 84th percentile is
15:47:28 2 the geometric mean times one standard deviation. The 97th
15:47:32 3 percentile is a geometric mean times two standard
15:47:36 4 deviations -- sorry. Times the standard deviation twice
15:47:39 5 or times the standard deviation squared.
15:47:41 6 Q Okay. So in this case, the number that you
15:47:46 7 used was 12 times the mean?
15:47:48 8 A 12 times the geometric mean.
15:47:51 9 Q 12 times the geometric mean.

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15:47:54 10 And that's 'X' divided by 'E' was 12 times
15:47:56 11 the geometric mean?
15:47:57 12 A The 'X' divided by 'E' that I'm reporting in
15:48:00 13 Table 1C is 12 times my estimate of the geometric mean
15:48:05 14 value of 'X' over 'E.'
15:48:06 15 Q All right. Now, the number that you're
15:48:08 16 reporting in Table 1C is an average of a low-range and the
15:48:13 17 high-range number, correct?
15:48:15 18 A Right. And probably to be more precise, we
15:48:18 19 should call these the lower bound and higher bound,
15:48:21 20 because I'm using "range" to refer to -- that this is a
15:48:27 21 high range of the exposure distribution.
15:48:30 22 And using "range" -- I mean, I've done it,
15:48:34 23 and it's not wise, I think. But to use "range" to have
15:48:37 24 two different meanings, I'm sure, is contributing to the
15:48:41 25 confusion.
15:48:42 26 Q I was going to point that out to you that
15:48:45 27 that was your term and not mine.
15:48:46 28 So what you're saying is lower bound and,

15:48:49 1 what, upper bound?
15:48:50 2 A Lower bound and upper bound on the estimate.
15:48:52 3 Q So you took a lower bound and an upper bound
15:48:56 4 and averaged them to come out with .33, correct?
15:48:59 5 A That's correct.
15:49:00 6 Q And what was the number for your lower
15:49:02 7 bound?
15:49:02 8 A I don't remember either number precisely,
15:49:06 9 but I can tell you that they differ approximately by a
15:49:09 10 factor of two. In fact, you can see that in Table 9 of my
15:49:12 11 original declaration, that the lower, let's call it, bound
15:49:17 12 and higher-bound estimates differ by a factor of two.
15:49:20 13 Q All right. Table 9 of your original one.
15:49:23 14 Okay.
15:49:24 15 A Look at 'X' over 'E.'
15:49:26 16 Q Right.
15:49:26 17 A .08 --
15:49:36 18 Q .018 --
15:49:36 19 THE REPORTER: I need it again.
15:49:36 20 THE WITNESS: Sorry.
15:49:36 21 THE REPORTER: "Look at 'X' over 'E.'"
15:49:36 22 THE WITNESS: .018 for the low bound and .037
15:49:40 23 for the high bound. Those differ by a factor of two.
15:49:44 24 BY MR. CAFFERTY:
15:49:44 25 Q So if you had the same relationship here,
15:49:45 26 then you would have, say, point --
15:49:49 27 A It's .22. -- .22 and .44, approximately.
15:49:54 28 Q Approximately, yields the .33?

15:49:58 1 A Right.
15:49:58 2 Q Okay. All right. Now, in performing this
15:50:04 3 calculation, what did you use as your marker to obtain
15:50:09 4 your cigarette ETS number?
15:50:12 5 A I didn't use anything.
15:50:14 6 Q Did you use RSP?
15:50:16 7 A No.
15:50:16 8 Q All right. If you take .33 in cigarette ETS
15:50:25 9 per day, how would you convert that into an RSP
15:50:30 10 concentration number?
15:50:32 11 A RSP exposure number, or present a dose in the
15:50:37 12 more formal language. But exposure, as I've referred to
15:50:40 13 it in the original declaration. It's not convertible
15:50:43 14 directly to concentration because it's a calculation of

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exposure or of dose.
Q Fair enough.
Let's make the intermediate calculation first, and then I want to make the calculation back to micrograms per cubic meter.
So let's take it first, how would you convert .33 back into a microgram of RSP per day?
A That's, in fact, what is done in this document in Table 1D and the note that corresponds to that.
If you turn to Bates No. 1438, the note for Table 1D says, "Multiply the median high-end exposure estimate of .22 cigarettes ETS per day by the emission factors of Table 5 of the declaration to obtain the

results entered."
So that's the --
Q I'm sorry. Where is 'E' again?
A The -- I'm referring to the notes that are on Bates No. 1438.
Q 1438. Okay.
A The heading is "Table 1D."
Q Uh-huh.
A And that explains how the entries in Table 1D were generated.
Q Okay.
A And it says, "Multiply the median high-end exposure estimate of .22 cigarettes ETS per day by the emission factors from Table 5 of the declaration" -- that is, my original declaration -- "to obtain the results entered."
Q Okay. So I guess --
A Well -- so, if I can continue, then --
Q Sure.
A -- these results in Table 1D give exposures, assuming -- exposures to specific constituents, assuming that the exposures in units of cig ETS per day is the .22 value that I have estimated as a best estimate value or a median value, it appears near the bottom of Bates No. 1435.
MR. McGUIRE: Is that 2400 for tobacco smoke RSP?
BY MR. CAFFERTY:

Q No. What you're talking about now is the .22?
A .22 cigarettes per day.
Q All right. Now, that's not what I want to get at.
What I want to get at is how would you convert .33, the number that you have for your back-of-the-envelope calculation?
A In exactly the same manner.
Q Okay.
A So take .33, multiply it by an emission factor. This is cig ETS per day. Multiply it by an appropriate emission factor, which is presented in Table 5 of the original declaration.
Q Okay. Let's turn to Table 5. I believe it's 10,900 for RSP, correct?
A That's correct.
Q All right. So you take .33. You multiply it by 10,900.

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15:53:40 20 A That's correct.
15:53:41 21 Q And what is the number that that yields?
15:53:46 22 A I don't have a calculator with me.
15:53:49 23 Q All right.
15:53:49 24 A But that yields -- the result it yields is
15:53:52 25 the micrograms per day inhaled by this estimate of the
15:53:56 26 high end of a distribution.
15:53:58 27 Q All right. So that would be the micrograms.
15:54:00 28 So it's .33 times 10,900, and then that will equal

15:54:09 1 micrograms per day. And if you do that, it comes out to
15:54:13 2 about 3600 micrograms per day. 3597, to be exact.
15:54:19 3 Now, how would you convert that into
15:54:22 4 micrograms per cubic meter?
15:54:25 5 A By dividing by the volume of indoor air
15:54:30 6 breathed per day.
15:54:31 7 Q All right. And for purposes of this
15:54:36 8 calculation, what did you assume on the
15:54:38 9 back-of-the-envelope calculation was the amount of indoor
15:54:42 10 air breathed per day?
15:54:47 11 A Probably -- well, it wasn't done in that
15:54:50 12 way. But it looks to me like it would be either 6.9 or
15:54:59 13 9.9 or the average of those two values, meters cubed.
15:55:04 14 MR. McGUIRE: Well, since you're doing an
15:55:08 15 average .33, should you use the average?
15:55:12 16 THE WITNESS: Yes. But it may not be
15:55:14 17 precisely the average. But for the purposes of an
15:55:17 18 approximate calculation, that's appropriate. 8.4, if I
15:55:26 19 can still do mental arithmetic.
15:55:28 20 BY MR. CAFFERTY:
15:55:28 21 Q 8.4.
15:55:30 22 So you'd take your .33 times 10,900 and then
15:55:34 23 divide it by 8.4?
15:55:37 24 A Yes.
15:55:37 25 MR. McGUIRE: What do you get, Pat?
15:55:59 26 MR. CAFFERTY: 428.
15:56:02 27 MR. McGUIRE: Thank you.
15:56:03 28 BY MR. CAFFERTY:

15:56:03 1 Q In fact, could you maybe do that calculation
15:56:06 2 for me and tell me what you come up with.
15:56:08 3 A Times .33, divided by 8.4. 428.
15:56:29 4 Q Okay. So that's 428 micrograms per cubic
15:56:33 5 meter?
15:56:33 6 A Yeah.
15:56:34 7 Q That's roughly what the .33 translates into
15:56:37 8 for RSP?
15:56:38 9 A Roughly.
15:56:38 10 Q Okay. And if you wanted to do that for the
15:56:41 11 other constituents that are listed in Table 1 -- or 1D,
15:56:47 12 you'd take the number from your emission factor in your
15:56:50 13 original declaration, multiply it times .33 for that
15:56:54 14 compound, and then divide by 8.4?
15:57:00 15 A That's right. That would give an estimate
15:57:03 16 that's consistent with the spirit of this calculation.
15:57:06 17 Q All right. And what would happen to your
15:57:09 18 number if instead of using 10,900, you use 13,700?
15:57:13 19 A My estimate would proportionately -- the
15:57:18 20 estimate of the concentration that we just came up with
15:57:21 21 would be proportionately higher.
15:57:23 22 Q So it would be 13,700 divided by 10,900
15:57:27 23 times --
15:57:27 24 A Times 428.

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15:57:29 25 Q All right. Now, let's talk about the Jenkins
15:57:32 26 study and how you used the Jenkins study to develop your
15:57:37 27 number that appears on Table 1C.
15:57:49 28 Could you briefly describe how you used the

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15:57:51 1 Jenkins study to come up with the .07 cig ETS per day
15:57:56 2 number?
15:57:57 3 A Yes. I hope it proves to be simpler than the
15:57:59 4 last go-around.
15:58:00 5 Q I think it is.
15:58:01 6 A I think it is too.
15:58:03 7 Jenkins, in his paper, presented 95th
15:58:08 8 percentile values in addition to, I think, median values.
15:58:15 9 And -- of the tracers that he measured in his study. So
15:58:23 10 this is Jenkins et al., '96.
15:58:25 11 Q Right.
15:58:26 12 A So I followed the same approach that I used
15:58:28 13 in my declaration, but applied it to the 95th percentile
15:58:33 14 values. And that basically was to take the amount of --
15:58:40 15 an exposure concentration and divide it by an emission
15:58:52 16 factor and then multiply it by an amount of indoor air
15:59:00 17 inhaled or a breathing rate. I don't recall, without
15:59:04 18 looking in my declaration, which it was, to get the
15:59:07 19 result.
15:59:07 20 Q Let's have you look at your declaration, just
15:59:14 21 so that we get the thing accurately. Again, back to 27.
15:59:24 22 Here's the other part of it.
15:59:26 23 MR. McGUIRE: Page 35.
15:59:44 24 THE WITNESS: Actually, I think it's page 41.
15:59:46 25 MR. McGUIRE: Okay. You're looking at
15:59:48 26 Table 7?
15:59:49 27 THE WITNESS: No. Table 11.
15:59:50 28 MR. McGUIRE: Okay.

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15:59:52 1 THE WITNESS: So my notes for this section of
15:59:56 2 Exhibit 559, when referring to the Jenkins et al. study,
16:00:05 3 indicate use the 95th percentile values reported in
16:00:08 4 Table 6. That's Table 6 of Jenkins.
16:00:10 5 BY MR. CAFFERTY:
16:00:10 6 Q Okay.
16:00:11 7 A Follow the procedure used in Table 11 of the
16:00:13 8 declaration. That is, in my declaration.
16:00:15 9 So Table 11 presents a set of entries for
16:00:22 10 mean exposure. And Cell 2 represents individuals who are
16:00:34 11 exposed away from work but not at work. And Cell 4
16:00:38 12 represents individuals who reported no ETS exposure. So I
16:00:43 13 ascribed the at-home exposure to the difference between
16:00:48 14 the Cell 2 and the Cell 4 value. That net exposure
16:00:54 15 concentration for each of the three constituents
16:00:57 16 considered, 3-EP, nicotine, and RSP, was divided by an
16:01:01 17 appropriate emission factor. That produces a number that
16:01:06 18 would have units of cigarettes of ETS per cubic meter.
16:01:09 19 And if I multiplied by an appropriate breathing rate, I
16:01:12 20 can get to cigarettes of ETS inhaled per day.
16:01:16 21 And so that was the procedure followed to
16:01:18 22 generate Table 11. I followed the same procedure here to
16:01:23 23 generate the estimate of .07 as a 95th percentile
16:01:31 24 estimate.
16:01:31 25 Q All right. Let's just briefly refer to the
16:01:34 26 Jenkins study, which I clipped here. It was Exhibit 40 to
16:01:42 27 your deposition. And let's just look at Table 6 and show
16:01:48 28 me exactly where these numbers come from in Exhibit 559.

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16:01:56 1 A Are we working from one copy here?
16:02:07 2 Q Yes. That's okay. I'm listening.
16:02:09 3 A Okay.
16:02:09 4 Q I have another copy, but I'm going to
16:02:11 5 listen.
16:02:13 6 Which page are you looking at?
16:02:15 7 A I am looking at page 488 of Jenkins et al.
16:02:21 8 It's their Table 36.
16:02:25 9 Q Okay. And that's Exhibit 40.
16:02:28 10 A The pertinent entries are from what is
16:02:30 11 listed as Cell 2 and Cell 4 in the Jenkins et al. table.
16:02:36 12 And they're entries within those rows that refer to the
16:02:41 13 95th percentile. And then there are three specific values
16:02:47 14 for each of those cells. One for 3-ethenylpyrridine, one
16:02:53 15 for nicotine, and one for RSP that I used.
16:02:56 16 Q Okay. Let's just do Cell 2 and show me where
16:02:59 17 the 3-EP, nicotine, and RSP numbers on Exhibit 559 come
16:03:05 18 from on Exhibit 40.
16:03:07 19 A Sure. I have entered 2.30 for Cell 2 for
16:03:11 20 3-EP.
16:03:12 21 Q Okay.
16:03:13 22 A That number appears in the corresponding
16:03:16 23 position in Table 6.
16:03:18 24 Q Okay.
16:03:19 25 A 95th percentile under the heading "3-EP" in
16:03:24 26 Cell 2. I've selected the number -- extracted the number
16:03:28 27 4.39 for nicotine. That number is immediately to the
16:03:32 28 right of 2.30 under the heading for nicotine. And for

16:03:37 1 RSP, I selected the number 76.3, which is presented two
16:03:41 2 columns to the right of the nicotine entry.
16:03:44 3 Q Okay. And then just for Cell 4, briefly, the
16:03:48 4 same thing?
16:03:49 5 A Cell 4, it's an analogous process of
16:03:53 6 extracting the data from the table.
16:03:55 7 .18 corresponds to the .182 for 3-EP 95th
16:04:01 8 percentile, Cell 4. .17 corresponds to .173 in Jenkins
16:04:09 9 table -- et al. table. And 41.5 is written as 41.5 in the
16:04:13 10 RSP column.
16:04:14 11 Q Okay. Now, in Dr. Jenkins' study, how many
16:04:19 12 of his 16 cities were in California?
16:04:21 13 A One.
16:04:21 14 Q Which one was that?
16:04:23 15 A Fresno.
16:04:23 16 Q How many of the values measured in Fresno for
16:04:28 17 3-EP were greater than 2.30 microgram per cubic meter?
16:04:34 18 A I don't know.
16:04:35 19 Q How many of the values determined in Fresno
16:04:40 20 for nicotine were greater than 4.39 micrograms per cubic
16:04:45 21 meter?
16:04:45 22 A I don't know.
16:04:46 23 Q How many of the values of RSP measured in
16:04:52 24 Fresno were greater than 76.3 micrograms per cubic meter?
16:04:59 25 A I don't know.
16:05:00 26 Q Are you aware of any measurements from any
16:05:03 27 California residence that have ever detected a 3-EP level
16:05:10 28 greater than 2.30 microgram per cubic meter?

16:05:15 1 A No, I'm not aware of such a measurement.
16:05:18 2 Q Are you aware of any measurements in any
16:05:20 3 California residence that have ever determined the
16:05:22 4 nicotine level greater than 4.39 micrograms per cubic
16:05:27 5 meter?

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16:05:28 6 A No.
16:05:28 7 Q Are you aware of any measurements in a
16:05:31 8 California residence that has ever determined a RSP level
16:05:35 9 greater than 76.3 micrograms per cubic meter?
16:05:39 10 A No, I'm not aware.
16:05:43 11 Q All right. How many of the 16 cities were in
16:05:49 12 the western part of the United States, and let's say west
16:05:54 13 of the Mississippi?
16:05:56 14 A I don't recall.
16:05:56 15 Q How many of them were in the West Coast?
16:06:01 16 A Likewise, I don't recall.
16:06:02 17 MR. McGUIRE: Do you want him to just -- are
16:06:05 18 you just testing his memory, or do you want him to look in
16:06:08 19 this report that you just opened for him?
16:06:10 20 MR. CAFFERTY: I'm just asking if he knows
16:06:12 21 it. Then I'd ask him some questions about it. But if he
16:06:15 22 doesn't --
16:06:15 23 BY MR. CAFFERTY:
16:06:15 24 Q By the way, this 16-city study, is a study
16:06:19 25 with which you're familiar, correct?
16:06:20 26 A Familiar, yes. I've read some of the results.
16:06:23 27 Q And you've read it carefully and understand
16:06:25 28 the nature of those results; is that right?

16:06:28 1 A I've read it carefully enough to support what
16:06:31 2 I want to do with it, yes.
16:06:32 3 Q Do you know if any of the measurements in
16:06:36 4 cities west of the Mississippi included in the Jenkins'
16:06:43 5 16-city study, measured 3-EP greater than 2.30 microgram
16:06:50 6 per cubic meter?
16:06:51 7 A No.
16:06:51 8 Q Do you know whether any of the measurements
16:06:56 9 in cities west of the Mississippi measured nicotine
16:07:00 10 greater than 4.39 micrograms per cubic meter?
16:07:04 11 A No, I do not know.
16:07:05 12 Q Do you know whether or not any of the
16:07:06 13 measurements in cities west of the Mississippi measured
16:07:10 14 RSP greater than 76.3 micrograms per cubic meter?
16:07:14 15 A No.
16:07:14 16 Q All right. Let's talk about the -- oh.
16:07:19 17 Okay. Now, one other question here about your table
16:07:23 18 here.
16:07:24 19 You took the cig ETS per day number for 3-EP,
16:07:33 20 nicotine, and RSP and averaged those numbers, correct?
16:07:38 21 A Correct.
16:07:38 22 Q Did you do that in your first calculation as
16:07:40 23 well?
16:07:40 24 A No, I didn't.
16:07:42 25 Q Why did you do it in this calculation?
16:07:45 26 A It was a judgment decision, and my judgment
16:07:56 27 at this visitation or this time when I was carrying out
16:08:00 28 these calculations, was that the additional number of

16:08:07 1 separate calculations was less informative than the --
16:08:13 2 than just providing a smaller number of entries. So there
16:08:16 3 are several cases in which I took multiple entries in my
16:08:20 4 original declaration and reported them as an average
16:08:25 5 result in the current addendum or supplement.
16:08:28 6 Q Okay. All right. Now, if you wanted to
16:08:31 7 convert the cig ETS per day into a microgram per cubic
16:08:36 8 meter number per day, would you use the same method that
16:08:40 9 we discussed for the back-of-the-envelope calculation?
16:08:43 10 A It's -- it depends on what the specific

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16:08:49 11 conversion was intended to do. Is it intended to predict
16:08:55 12 the concentration for 24-hour average period, or for only
16:09:00 13 the period of occupancy? But, generally, yes. I mean,
16:09:07 14 the same -- the same type of calculation would be done.
16:09:12 15 Q All right. Let's talk about the next one
16:09:20 16 down, which is Heavner.
16:09:21 17 MR. McGUIRE: Before you do that, let's take
16:09:23 18 five minutes, please.
16:09:24 19 MR. CAFFERTY: Oh, sure.
16:09:26 20 VIDEOGRAPHER: We are off the record. The
16:09:28 21 time is 4:09.
16:09:30 22 (Recess.)
16:17:07 23 VIDEOGRAPHER: We are back on the record.
16:17:30 24 The time is 4:17.
16:17:32 25 BY MR. CAFFERTY:
16:17:32 26 Q All right. Dr. Nazaroff, we were going
16:17:42 27 through your Table 1C. So let's come back to that again
16:17:45 28 in Exhibit 559. Let's talk about the Heavner et al.,

16:17:49 1 1995, 3-EP as tracer.
16:17:53 2 Is that the only tracer that was used in the
16:17:56 3 Heavner 1995 study?
16:17:58 4 A No. But it was the only one that I used in
16:18:01 5 my original declaration.
16:18:02 6 Q Okay. Did you perform this calculation
16:18:05 7 reflected in Exhibit 559 using anything other than 3-EP as
16:18:10 8 a tracer?
16:18:10 9 A No.
16:18:11 10 Q All right. Under the note, it says, "maximum
16:18:19 11 among 25 smoking, 24 nonsmoking households."
16:18:24 12 We had previously marked as Exhibit 41, the
16:18:29 13 Heavner 1995 study.
16:18:32 14 Using Exhibit 41, could you show me what
16:18:35 15 number you picked?
16:18:40 16 A Yes. I believe I can do that.
16:18:41 17 The -- there's a bit of explanation that
16:18:58 18 appears on Bates No. 1347, under Heavner et al., 1995.
16:19:05 19 And it refers to maximum values reported in Table 1 for
16:19:09 20 3-EP.
16:19:10 21 So turning to Table 1 of Heavner, which is
16:19:14 22 page 7 of Exhibit 41, and looking down the left-hand
16:19:29 23 column towards -- near the bottom where I find
16:19:33 24 3-ethenylpyrridine, and then looking across in that row to
16:19:52 25 the two columns that are headed "maximum," I find the
16:19:57 26 values that I used.
16:19:59 27 So under the left-hand column that has a
16:20:02 28 heading of "maximum," I find a value of .57 micrograms per

16:20:07 1 cubic meter for nonsmoking homes, and under the column
16:20:15 2 labeled or headed "maximum under smoking homes," I find
16:20:19 3 5.58 micrograms per cubic meter.
16:20:23 4 So, as indicated in the notes to Table 1C, I
16:20:29 5 took the difference between those two values, and as I had
16:20:34 6 done in my original declaration, divided by an emission
16:20:39 7 factor and multiplied by an indoor air volume breathed per
16:20:43 8 day, to obtain .07 cigarettes of ETS per day as the
16:20:47 9 estimated exposure.
16:20:49 10 Q Okay. Now, I see on 1437 that your amount of
16:20:54 11 air breathed per day was 6.9 cubic meters per day.
16:20:59 12 That's under Heavner et al., 1995.
16:21:01 13 Do you see that?
16:21:03 14 A That's correct.
16:21:04 15 Q So that's the value that you used for the

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16:21:06 16 amount of air that was breathed?
16:21:08 17 A That's right.
16:21:09 18 Q Going back to Jenkins et al., which is right
16:21:12 19 above that on 1437, is that table that you have there
16:21:16 20 missing the amount of air that was breathed in a day?
16:21:20 21 A It's not reported there, but it follows
16:21:22 22 directly from Table 11 that's in my declaration. I
16:21:25 23 followed the same procedure that's reported for that
16:21:27 24 table.
16:21:27 25 Q So did you use 6.9 cubic meters per day for
16:21:33 26 that calculation as well?
16:21:34 27 A No. In that case, I used 20 cubic meters per
16:21:38 28 day.

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16:21:38 1 Q All right. And that's because the numbers
16:21:40 2 were 24-hour numbers?
16:21:42 3 A That's right.
16:21:42 4 Q Okay. And these numbers for Heavner, what
16:21:46 5 duration were those for?
16:21:51 6 A I don't recall. It's reported in the
16:21:54 7 original document and in my declaration. I'm happy to
16:21:58 8 look it up if you like, but it's not hard to find.
16:22:02 9 Q Okay. No. I don't think we need to do
16:22:05 10 that.
16:22:06 11 Now, let's move on to the next Heavner, which
16:22:08 12 is Heavner 1996, and if you could briefly explain how you
16:22:14 13 used that 1996 study. And that one is marked as
16:22:19 14 Exhibit 42. Explain how you used that study to come up
16:22:24 15 with a number that you show in the "exposure" column on
16:22:27 16 Exhibit 559, Table 1C.
16:22:31 17 A The procedure that I used in -- for that
16:22:36 18 study was analogous to and similar to the one that I used
16:22:42 19 for Jenkins et al., and especially for the Heavner 1995
16:22:47 20 study.
16:22:48 21 So I took the highest values that were
16:22:52 22 reported. These studies didn't report 95th percentile
16:22:57 23 values, but, rather, reported maximum values for -- that
16:23:01 24 were measured in the sites where monitoring was done. And
16:23:06 25 so I used those maximum values and calculated an estimated
16:23:10 26 exposure to cigarettes ETS per day, or in those units,
16:23:14 27 both using 3-ethenylpyrridine and RSP as the marker
16:23:21 28 compounds. And then I took the average of those two

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16:23:25 1 results to obtain what I call the best estimate from this
16:23:28 2 study.
16:23:29 3 Q Okay. Now, using Exhibit 42, could you show
16:23:33 4 me where in Exhibit 42 you get the numbers that you used
16:23:36 5 for 3-EP?
16:23:38 6 A Yes. As noted in my notes for Table 1C, I
16:23:47 7 extracted the number from Table 4 for 3-EP. And going
16:24:04 8 down the left-hand column to near the bottom, I find
16:24:07 9 3-ethenylpyrridine listed. Heading across that row, then,
16:24:14 10 under the column headed "maximum for nonsmoking home," I
16:24:18 11 find the entry .09. So that entry is reproduced on -- in
16:24:23 12 my notes, again, Bates No. 1437.
16:24:30 13 Continuing across the row in the Heavner
16:24:32 14 study, I come to the entry under the heading "maximum
16:24:37 15 smoking home" of 3.62 micrograms per cubic meter. And
16:24:42 16 that number also reappears -- or it appears in my notes.
16:24:46 17 So I took the difference between those two
16:24:50 18 and assumed that that result is ascribable to a high-bound
16:24:55 19 or a high-range estimate for environmental tobacco smoke.
16:25:00 20 And then, as before, multiplied by an appropriate indoor

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16:25:03 21 air breathed -- volume breathed and divided by an emission
16:25:06 22 factor to get cigs ETS per day of exposure.
16:25:10 23 Q All right. Now, using that same study,
16:25:13 24 Exhibit 42, could you show me where you got the numbers
16:25:16 25 for RSP that you used in this calculation?
16:25:19 26 A Sure. Those numbers appear in Table 6, I
16:25:23 27 believe. And they are from the first row of that table.
16:25:31 28 And they map in direct correspondence to how I extracted

16:25:35 1 the 3-EP number. There's a row labeled "RSP for the
16:25:39 2 anilite. The maximum nonsmoking entry is 100 micrograms
16:25:43 3 per cubic meter. The maximum in a smoking house is 825
16:25:48 4 micrograms per cubic meter. And so I used those two
16:25:51 5 entries in the same procedure to make an estimate.
16:25:54 6 Q Now, referring back to Table 1C, in your
16:25:59 7 "notes" column, it says, "maximum among 32 smoking, 61
16:26:03 8 nonsmoking households." Then it says, "average for 3-EP
16:26:07 9 and RSP for tracer."
16:26:10 10 What would the results have been -- or what
16:26:11 11 were the results when you did it just for 3-EP?
16:26:14 12 A Those appear in the notes. The 3-EP number
16:26:17 13 is .09 cigarette ETS per day.
16:26:21 14 Q And what's the number for the RSP?
16:26:24 15 A .81 -- sorry. .81 cigarettes ETS per day.
16:26:30 16 Q And the average, then, is .81 plus .09
16:26:35 17 divided by two which gives you the .45?
16:26:38 18 A That's correct.
16:26:39 19 Q All right. Under the notes on 1437, it
16:26:46 20 says, "Use average of lower bound and upper bound for
16:26:48 21 indoor air breathed per day, 12.2 cubic meters per day."
16:26:53 22 Where does that number come from?
16:26:55 23 A The discussion of that point appears in my
16:27:00 24 original declaration in connection with the Heavner et al.
16:27:04 25 1996 study.
16:27:06 26 Referring in my declaration to page 48,
16:28:16 27 Footnote B to Table 15, explains that my calculation is
16:28:25 28 based on a lower bound of range obtained as net divided by

16:28:30 1 emission factor times indoor air breathing volume of 9.5
16:28:34 2 cubic meters per day, three cubic meters while asleep for
16:28:38 3 8 hours, plus 1.06 cubic meters times 6.1 hours indoors
16:28:44 4 awake. So that's the basis of the 9.5 lower-bound
16:28:48 5 estimate.
16:28:49 6 Upper bound of the range obtained under the
16:28:52 7 assumption that ETS levels are zero during sleeping
16:28:54 8 hours. And the effect of that is captured by assuming
16:29:02 9 that all the measured concentrations occur during the time
16:29:06 10 when people are awake. And the way that I translated that
16:29:11 11 was to just assume that there was a higher breathing
16:29:14 12 rate -- or higher volume of indoor air breathed, which
16:29:18 13 results in the same outcome.
16:29:21 14 And that higher result would be 14.1 times
16:29:25 15 1.06 cubic meters per day. And then the average of those
16:29:32 16 two produces the 12.2 cubic meters per day.
16:29:36 17 Q Okay. So basically -- this is probably the
16:29:41 18 simplest point.
16:29:42 19 The average of lower bound and upper bound
16:29:44 20 for indoor air breathed per day value of 12.2 cubic meters
16:29:49 21 per day is the same number that you used in your
16:29:52 22 declaration?
16:29:53 23 A That's correct.
16:29:55 24 Q All right. Let's talk about the Miller
16:29:58 25 study.

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16:29:59 26 A This is 1998a, correct?
16:30:02 27 Q Right. VOC monitoring.
16:30:06 28 A Yes.

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16:30:07 1 Q And did we have that marked as an exhibit the
16:30:09 2 first time?
16:30:10 3 A I don't recall.
16:30:10 4 Q I don't see that marked as an exhibit the
16:30:55 5 first time.
16:30:55 6 Why don't you briefly explain to me how you
16:30:58 7 did the calculation reflected on Table 1C using the Miller
16:31:03 8 study.
16:31:04 9 A Miller et al. report estimates of the
16:31:13 10 ETS-only exposure distribution for four specific volatile
16:31:22 11 organic compounds. Those are benzene, styrene, and then
16:31:29 12 some cogeners of xylene. I think they're separated into
16:31:35 13 o-xylene and m- and p-xylene together.
16:31:43 14 I took those results, which are reported in
16:31:46 15 terms of lognormal distribution parameters, and calculated
16:31:50 16 a 95th percentile -- actually, a two sigma above the mean
16:31:55 17 value for each of the four compounds and then took the
16:31:57 18 average of those four.
16:31:59 19 Q Okay. I found it. It's Exhibit 30. It's
16:32:03 20 the Miller report.
16:32:04 21 Maybe if you could show me where in
16:32:06 22 Exhibit 30 you got the data that you used in this
16:32:10 23 calculation.
16:32:10 24 A Yes. As noted in my notes, the data appear
16:32:25 25 in Table 2 of the Miller et al. paper, and I used the rows
16:32:32 26 in that table that are labeled "ETS only," under "benzene,
16:32:38 27 styrene, o-xylene and m,p-xylene. And reading across
16:32:44 28 those rows, I used two parameters from each row, the

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16:32:48 1 geometric mean value and the geometric standard deviation
16:32:52 2 value. And I computed a value that's two standard
16:32:57 3 deviations above the mean based on the --
16:33:00 4 MR. McGUIRE: I'm sorry. Keep going.
16:33:02 5 THE WITNESS: -- based on the approximation
16:33:04 6 or the estimate that these distributions are lognormal,
16:33:09 7 by -- actually, in the same way as we have discussed
16:33:12 8 before, taking the geometric mean and multiplying it by
16:33:16 9 the square of the geometric standard deviation.
16:33:18 10 BY MR. CAFFERTY:
16:33:18 11 Q Is that simply multiplying it by 12, as we
16:33:22 12 said before, or is the geometric standard deviation
16:33:24 13 different here?
16:33:25 14 A The geometric standard deviation is quite
16:33:26 15 different. In fact, it's quite different in each of the
16:33:28 16 four -- for each of the four compounds.
16:33:30 17 Q Is there any place in any of the documents
16:33:33 18 that have been produced to us that show how you did those
16:33:36 19 calculations?
16:33:36 20 A Yes. That's -- or at least the results of
16:33:41 21 the calculation are shown with some detail in the page
16:33:46 22 that's marked Bates No. 1438. There's a table there that
16:33:50 23 follows the previous page that corresponds to the Miller
16:33:53 24 et al. study.
16:33:55 25 So you can see under "compound," the four
16:33:59 26 compounds that I considered, the geometric mean and the
16:34:01 27 geometric standard deviations extracted from the original
16:34:05 28 study. The calculation here of the geometric mean times

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16:34:09 1 the square of the geometric standard deviation, division

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16:34:12 2 by an emission factor. And not shown, I guess, is the
16:34:18 3 multiplication by a breathing rate -- I mean, what the
16:34:21 4 breathing rate is. That's the same as I used in my
16:34:24 5 original declaration, to get to an exposure estimate.
16:34:27 6 MR. McGUIRE: Xylene is spelled x-y-l-e-n-e.
16:34:37 7 BY MR. CAFFERTY:
16:34:37 8 Q All right. And then in calculating the .77,
16:34:46 9 did you simply average the four values, one for benzene,
16:34:49 10 for styrene, one for o-xylene, and one for m,p-xylene?
16:34:54 11 A That's correct. That's what I did.
16:34:56 12 Q All right. So if you had just used benzene,
16:34:59 13 you would have come up with .08?
16:35:01 14 A That's right.
16:35:02 15 Q And if you had just used o-xylene, you would
16:35:05 16 have come up with 1.97?
16:35:08 17 A That's right.
16:35:08 18 Q Why is there so much variability in those
16:35:12 19 numbers?
16:35:13 20 A It's a -- there is a higher uncertainty. And
16:35:18 21 that's actually reflected in the work here, in estimating
16:35:20 22 the tail of a distribution or the extremes -- not the
16:35:24 23 extremes, but a percentile of the distribution that's
16:35:27 24 removed from the central tendency. And so that's one
16:35:32 25 factor.
16:35:33 26 And then the other factor is that because
16:35:37 27 benzene, styrene, and the xylenes have sources other than
16:35:41 28 environmental tobacco smoke in residences, our

16:35:44 1 calculations are based on looking at fairly small
16:35:48 2 differences between levels -- percentage-wise between
16:35:53 3 levels in smoking households and nonsmoking households.
16:35:57 4 So that adds to the uncertainty, just from statistical
16:36:03 5 variability.
16:36:03 6 Q All right. So, for example, the geometric
16:36:05 7 mean for o-xylene, looking at 1438 at the top of the page,
16:36:12 8 is 0.1, but the geometric mean times two standard
16:36:18 9 deviations is actually 6.2, 62 times?
16:36:22 10 A That's right.
16:36:22 11 Q All right. And the emission factor is 63.
16:36:26 12 So you end up with 1.97.
16:36:31 13 Now, how does that -- how do you get that
16:36:33 14 1.97 number?
16:36:35 15 A The missing input data is the volume of air
16:36:41 16 breathed per day.
16:36:41 17 Q All right. And what is --
16:36:42 18 A And, here, 20 cubic meters per day is the
16:36:46 19 appropriate value to use.
16:36:47 20 Q And is that because these are 24-hour numbers?
16:36:50 21 A That's right. They're 24-hour average
16:36:53 22 exposure levels.
16:36:55 23 So 6.2 divided by 63 times 20 produces a
16:36:59 24 number that's very close to 2.
16:37:00 25 Q All right. So are you assuming, then, in
16:37:02 26 making this calculation that the adult breathes all 20
16:37:06 27 cubic meters from the same indoor air environment?
16:37:10 28 A No. Because the parameters that correspond

16:37:19 1 to ETS-only distribution that I've used in these
16:37:22 2 calculations are the average increment -- or they
16:37:27 3 represent the increment that a nonsmoker exposed to
16:37:30 4 environmental tobacco smoke gets above the nonsmoker who
16:37:35 5 is not exposed to environmental tobacco smoke, averaged
16:37:38 6 over a full 24-hour period.

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16:37:40 7 So it may be that for a shorter part of the
16:37:43 8 time, they're exposed to ETS at a higher level, and that
16:37:46 9 when you take the combination of the time of exposure and
16:37:50 10 that level, that averages out to an equivalent 24-hour
16:37:54 11 contribution of .1.
16:37:57 12 Q All right. Let's talk about the biomarker --
16:38:02 13 or excuse me, the Ozkaynak.
16:38:07 14 Did I pronounce that correctly?
16:38:09 15 A Ozkaynak. Ozkaynak. I'm not quite sure
16:38:12 16 myself.
16:38:13 17 Q Ozkaynak says "NA," which that means, what,
16:38:16 18 not available?
16:38:17 19 A I was unable to make a comparable calculation
16:38:21 20 from that study. That's correct.
16:38:23 21 Q Why were you unable to do that?
16:38:24 22 A The primary published report, that is, the
16:38:30 23 one that appears in the archival literature, doesn't
16:38:34 24 provide enough information for me to extract what the
16:38:37 25 range of exposures related to environmental smoke is. It
16:38:41 26 only gives me information that pertains to the median or
16:38:44 27 mean condition.
16:38:45 28 Q Okay. And then for the Pirkle et al., 1996,

16:38:52 1 serum cotinine on Table 1C, it also says "NA."
16:38:56 2 Again, NA, does that mean not applicable?
16:38:59 3 Not available? What did you mean by that term?
16:39:01 4 A I don't know -- what I intended -- I don't
16:39:03 5 know what it stands for. But what I intended is I
16:39:07 6 couldn't do the calculation. So there's no result that I
16:39:10 7 could report that is based on those studies, using this
16:39:13 8 methodology.
16:39:13 9 Q And why couldn't you use that study to do
16:39:16 10 this calculation?
16:39:16 11 A Likewise, the primary document that I relied
16:39:20 12 upon, the archival peer-review journal article that I
16:39:25 13 relied upon in my declaration, doesn't include enough
16:39:30 14 information for me to see the variability in the
16:39:34 15 distribution out to the 90th percentile or the 95th
16:39:37 16 percentile.
16:39:38 17 Q Okay.
16:39:40 18 A Especially focusing on exposure at home.
16:39:43 19 They do have distributional information for cotinine
16:39:46 20 levels among nonsmokers who report being exposed. But
16:39:49 21 they don't separately show that for exposed at work or in
16:39:53 22 other settings versus exposed at home.
16:39:56 23 Q All right. Let's talk again about Heavner.
16:39:59 24 One of the things I forgot to ask you to do on that was to
16:40:03 25 tell me how you would calculate microgram per cubic meter
16:40:07 26 concentration number from the 0.45 cig ETS per day number
16:40:12 27 that you have in Table 1C.
16:40:14 28 A Well, the procedure should be the same

16:40:23 1 procedure as we have outlined in other approaches. So one
16:40:27 2 would multiply the cig ETS result by an appropriate
16:40:36 3 emission factor for the species of interest.
16:40:38 4 Q All right. So for RSP, we'll use 10,900
16:40:42 5 again.
16:40:42 6 A Fine.
16:40:43 7 Q So it's .45 times 10,900.
16:40:46 8 A And then divide by an appropriate volume of
16:40:49 9 air inhaled. And I'd suggest that the appropriate value
16:40:52 10 here would be the 12.2 number that I used in my
16:40:55 11 calculations.

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16:40:55 12 Q Okay. All right. Could you do that for me
16:40:59 13 and tell me what you come up with.
16:41:13 14 A I come up with 402, or 400 micrograms per
16:41:26 15 cubic meter.
16:41:27 16 Q So it's a little bit less than the
16:41:29 17 back-of-the-envelope calculation concentration that we
16:41:32 18 came up with before, which was 428?
16:41:34 19 A Right. 7 percent difference is really a
16:41:37 20 negligible difference in this context.
16:41:39 21 Q All right. And then how about the .77 for
16:41:42 22 Miller et al., how would we calculate a
16:41:46 23 microgram-per-cubic-meter number for that?
16:41:52 24 A Well, because those are daily average values,
16:41:54 25 I think it's appropriate for that number to multiply by
16:41:58 26 the -- again, the emission factor, as we've done.
16:42:02 27 Q So .77 times -- we'll do an RSP --
16:42:06 28 A Okay.

16:42:07 1 Q -- times 10,900?
16:42:08 2 A And then divide by the full day's air
16:42:11 3 breathed, 20 cubic meters per day.
16:42:14 4 Q Could you do that and see what number we come
16:42:16 5 up with.
16:42:16 6 A 420.
16:42:27 7 Q All right. So it's in the same range as the
16:42:31 8 back-of-the-envelope and the Heavner 1996 numbers that you
16:42:35 9 did before?
16:42:36 10 A That's correct.
16:42:37 11 Q Okay. Now, let's talk about the time
16:42:41 12 dependent modeling of exposure. And if you could briefly
16:42:45 13 explain -- and maybe using your notes on page 1438 might
16:42:52 14 help, explain how that differs from the Case 1 calculation
16:42:55 15 that you did in your declaration.
16:42:58 16 A Well, this difference is actually quite
16:43:01 17 simple. In the original Case 1 calculation, I considered
16:43:08 18 a smoker who consumes an average number of cigarettes per
16:43:12 19 day. I took 16 as that value. And in this case -- that
16:43:20 20 is, for the high-exposure estimate -- what I wanted to do
16:43:23 21 was select somebody who is a moderately heavy smoker
16:43:28 22 instead of an average smoker. So I took for that value
16:43:32 23 two packs per day and assumed everything else was the same
16:43:35 24 as it was before.
16:43:36 25 Q Okay. Now, the two packs per day with 40
16:43:39 26 cigarettes, as indicated in here, 40 divided by 16 in the
16:43:43 27 notes on 1438, the 40 cigarettes, did you assume that all
16:43:48 28 40 of those cigarettes were smoked in the residential

16:43:50 1 environment?
16:43:51 2 A No, I didn't.
16:43:52 3 Q How much did you assume were smoked in the
16:43:54 4 residential environment?
16:43:56 5 A The same proportion that I assumed in the
16:43:58 6 original declaration. We could go back and take a look at
16:44:01 7 that if you like.
16:44:02 8 Q If you could. Because I just want to
16:44:04 9 understand what the number was, what the 40 translates
16:44:07 10 into.
16:44:08 11 A Right.
16:44:08 12 Q It's 27. I lost it. I should have it in a
16:44:19 13 notebook.
16:44:20 14 A In the Case 1 calculation, I had the child
16:44:40 15 and the caregiver, the parent, indoors for all but four
16:44:46 16 hours during the course of the day. From Figure 7, we can

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see 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 -- 12 peaks in the predicted concentration of benzene indoors. That tells me that this calculation is based on 12 cigarettes being smoked in the residence out of the 16 total, or three-quarters of the cigarettes being smoked.

So in the high-range estimate, I'm assuming that 30 cigarettes are being smoked in this residence, three-fourths of the total of 40.

Q Okay. All right. Then, again, how would you translate the .22 number that you have in exposure cig ETS per day into a microgram-per-cubic-meter number for this particular calculation method, the Case 1 time dependent

modeling of exposure?

A Corresponding daily average value would be obtained by multiplying, again, the exposure in cigs ETS per day.

Q So for RSP, it would be .22 times 10,900?

A By the emission factor.

Q Okay.

A And dividing by the volume of air inhaled. In this case, it's the volume of air inhaled by a child. So it's less than the 20 cubic meters per day.

Q What was the number that you used for this calculation?

A I would have to refer to my declaration, to refresh my memory.

15 cubic meters per day.

Q You assume that the child breathes 15 cubic meters per day?

A That's correct.

Q Were all 15 of those cubic meters breathed indoors?

A No.

Q Do we still divide by 15 cubic meters, or do we divide by something less than that?

A Dividing by 15 cubic meters per day produces an estimate of the 24-hour time-weighted average increment of RSP exposure that that child gets, from ETS.

Since some of the time is spent outdoors -- and if the scenario were played out, and if you put a

monitor that measured 24-hour average concentrations of RSP in the apartment where these people live, you would get the number that we would calculate by this relationship.

But that number would have higher contributions from the period when the caregiver is at home and smoking and lower contributions from the overnight period and from the period where they're out of the house.

Q Okay. So the appropriate denominator for your calculation is 15 cubic meters?

A To produce a 24-hour time-weighted average exposure concentration for that child, which is a good approximation or closely related to the 24-hour concentration that would occur in the residence, 24-hour average.

Q Okay. How would we calculate the average during the period of time that the mother and the child are at home in the house when the mother is smoking?

A The proper way to make that calculation is to go back to my computer model and take minute-by-minute

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16:48:25 22 results which are predicted and average those during the
16:48:28 23 intervals that you've specified. I haven't done that. So
16:48:31 24 I -- and we can't do a kind of a one-line calculation that
16:48:37 25 would be accurate.
16:48:38 26 Q Today, at the deposition?
16:48:40 27 A No.
16:48:40 28 Q You need to have the computer model to be

16:48:42 1 able to do that?
16:48:43 2 A That's right.
16:48:43 3 Q We have to be careful about talking at the
16:48:46 4 same time. And I'm as guilty of it as you are.
16:48:48 5 All right. Well, if we do it the way you're
16:48:53 6 suggesting, could you just do that quick calculation for
16:48:56 7 me, .22 times 10,900, divided by 15 cubic meters.
16:49:02 8 What does that give us in micrograms per
16:49:04 9 cubic meter?
16:49:06 10 A 160, if I've done it correctly. I have
16:49:23 11 trouble with your calculator. Sorry. 160.
16:49:35 12 MR. McGUIRE: That's micrograms per --
16:49:38 13 THE WITNESS: Per cubic meters.
16:49:41 14 MR. McGUIRE: Per day?
16:49:41 15 THE WITNESS: No. Not per day. But as a
16:49:44 16 daily, 24-hour concentration increment, most properly
16:49:48 17 associated with a monitor that would be placed on the
16:49:53 18 child for that 24-hour period. Reasonably well
16:49:55 19 approximated by what you would get from measuring the
16:49:58 20 indoor increment of ETS contribution to RSP.
16:50:04 21 BY MR. CAFFERTY:
16:50:04 22 Q All right. Now, the final one.
16:50:06 23 Microenvironmental modeling, Miller et al., 1998b. Let's
16:50:11 24 see if we've got that one. We must have that.
16:50:13 25 If we have 'A,' we must have 'B,' right?
16:50:16 26 MR. McGUIRE: Exhibit 31.
16:50:17 27 MR. CAFFERTY: That may be a good guess. But
16:50:21 28 we'll see. No. That's Daisey.

16:50:25 1 BY MR. CAFFERTY:
16:50:25 2 Q Is Miller 1998b, the Contribution of
16:50:36 3 Environmental Tobacco Smoke to the Exposure of
16:50:39 4 Californians for 16 Toxic Air Contaminants? Is that the
16:50:43 5 same one?
16:50:43 6 A No. That's probably a brief, like an
16:50:46 7 abstract to a conference.
16:50:48 8 Q Okay.
16:50:49 9 A That's not it. It has a title that's not
16:50:53 10 greatly different, but it's a much longer -- it's a long
16:50:57 11 report. It's the report to the Air Resources Board on the
16:51:01 12 research project that we did looking at air toxics
16:51:08 13 exposure from ETS.
16:51:13 14 MR. McGUIRE: While they're looking, all of
16:51:42 15 these exposure estimates that we've been going through
16:51:45 16 with Mr. Cafferty, are they all -- do they all come out in
16:51:50 17 the same metrics, micrograms per cubic meter?
16:51:54 18 THE WITNESS: The extension to the work that
16:51:56 19 I presented that he's asked me to do, all is measured in
16:52:00 20 the same units, yeah.
16:52:01 21 MR. McGUIRE: And that's micrograms per cubic
16:52:03 22 meter?
16:52:03 23 THE WITNESS: Per cubic meter, yeah.
16:52:05 24 MR. McGUIRE: Is that a per day, or per hour,
16:52:08 25 or weighted average per 24 hours?
16:52:11 26 THE WITNESS: It's a weighted average for

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some interval. It's not always for 24 hours.
BY MR. CAFFERTY:

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Q Well, I tell you what. I don't see it here.
So why don't you just explain how you used Miller 1998b to calculate the .07 number in the "exposure" column on Exhibit 559, Table 1C.
A Right. In that report, Figure 6.9 shows percentile values of exposure in different microenvironments for California nonsmokers who are exposed to environmental tobacco smoke in these different microenvironments for conditions in the late 1990s.
And one of the microenvironments for which calculations were done was residences, one's own residence. The figure is presented in a way that gives, among other values, the 90th percentile of the distribution in exposure now measured in the conventional exposure units, which is micrograms -- it's actually exposure to benzene. Micrograms per cubic meter times hours for a 24-hour period.
So I read the 90th percentile values for adults, adolescents, and children. They're separately calculated. And the results are as reported here. 35 on page 1438, Bates number. 35 microgram hours per cubic meter for adults, 30 for adolescents, and 40 for children is the 90th percentile values.
Because these are not hugely different, I just took 35, the average of the three values, as the central estimate. I divided by an emission factor for benzene. And because all of the work in that paper -- or that report is based on Daisey et al., emission factors,

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to be consistent, I used the Daisey et al. emission factor for benzene here. 406 micrograms per cigarette.
And then taking that -- so that exposure number, dividing by an emission factor, and multiplying by a breathing rate in volume of air inhaled per hour. And here I used 20 cubic meters per day divided by 24 hours per day to get cubic meters per hour. That led to the result, .07 cigarettes ETS per day.
Q Okay. How does that differ from the way you used Miller in your declaration to come up with the estimates in Table 1A?
MR. McGUIRE: If at all.
THE WITNESS: The general procedure is the same. In Table -- in the work that appears in my declaration that fed into Table 1A, there were a few things that were done differently. But they were really more -- just more that was done. And this effort was to try to distill that to a simpler set of calculations.
What was done more was to explicitly carry out calculations separately for adults, adolescent, and children -- adolescents and children rather than to average them within the calculation, as I've done here.
And in the original Miller et al. work, we did exposure estimates using four different sets of input data. There was a -- one intended to be a high-range estimate. One intended to be a low-bound estimate. And then two intended to be central estimates. And all four of those are carried forward in the original declaration,

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but I've only taken one of the central estimates for this supplemental work.

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16:57:02 3 BY MR. CAFFERTY:
16:57:02 4 Q In terms of the microgram per cubic meter
16:57:05 5 hour numbers that you used, how did those numbers differ
16:57:13 6 in your calculations set forth in Exhibit 559 from the
16:57:18 7 declaration that you provided previously?
16:57:22 8 A Let me refer, if I may, to the declaration to
16:57:27 9 see which numbers I used there.
16:57:32 10 The relevant part of the declaration in
16:57:56 11 response to this question is in page 79, Table 22, which
16:58:00 12 shows arithmetic mean, residential benzene exposures from
16:58:08 13 ETS for the nonsmoking part of the California population
16:58:11 14 exposed in their own homes.
16:58:13 15 And the entries in that table show results
16:58:18 16 for adults, adolescents, and children, separately for the
16:58:23 17 four scenarios that I discussed. The TL scenario
16:58:27 18 intending to be a lower-bound estimate. The TH scenario
16:58:31 19 intending to be an upper-bound estimate. And the two 'M'
16:58:35 20 scenarios, TM and CM, intending to be central estimates.
16:58:46 21 Those are all estimates of the average
16:58:48 22 condition. The new calculation is for the 90th percentile
16:58:57 23 of the distribution.
16:58:58 24 Q Okay. Does the 90th percentile assume that
16:59:06 25 there is a lognormal distribution for the benzene numbers?
16:59:10 26 A No. It doesn't make that assumption.
16:59:12 27 Q How does it determine what the 90th
16:59:16 28 percentile is?

16:59:17 1 A The approach that was used to generate the
16:59:22 2 distributions in that study was based on a Monte Carlo
16:59:32 3 sampling technique where we put in the best available data
16:59:36 4 that we had, either measurement data or modeling parameter
16:59:42 5 values, and we randomly sampled in a -- sort of a
16:59:49 6 simulation of constructing exposure based on activity
16:59:52 7 pattern data for individuals. That generates specific
16:59:59 8 results for particular individuals that you can then sort
17:00:02 9 from lowest to highest and calculate specific percentile
17:00:06 10 values without having to make an assumption about the
17:00:08 11 shape of the distribution.
17:00:09 12 Q All right. Are the numbers that you used for
17:00:13 13 the 90th percentile specifically reported in Figure 6.9 of
17:00:17 14 the report?
17:00:18 15 A The figure presents them in a graphical
17:00:21 16 form. I just read those numbers from the graph.
17:00:23 17 Q Okay. Did you use the Daisey et al.,
17:00:27 18 emission factor 406 micrograms per --
17:00:31 19 A Cigarette.
17:00:33 20 Q -- cigarette ETS number in your declaration
17:00:36 21 calculations?
17:00:39 22 A I did use it in the declaration calculations.
17:00:42 23 Q Did you use the breathing rate of 20 cubic
17:00:45 24 meters per day in the calculation that you made in the
17:00:50 25 declaration regarding the Miller 1998b data?
17:00:53 26 A Yes.
17:00:53 27 Q So would it be fair to say that the only
17:01:01 28 difference between the two calculations is that you used a

17:01:05 1 different benzene exposure number for this new calculation
17:01:09 2 reflected in 559 -- Exhibit 559?
17:01:13 3 A That's correct.
17:01:14 4 Q All right. Now, at the bottom of Table 1C,
17:01:24 5 there is an overall summary: median, mean, and range.
17:01:29 6 The range is simple. You just take the lowest number,
17:01:32 7 which is .07 for Jenkins 1996, and Heavner 1995, and then

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17:01:39 8 the highest is 0.77, which is Miller et al.
17:01:44 9 That's how you calculated that, correct?
17:01:45 10 A That's correct.
17:01:46 11 Q How did you calculate the median?
17:01:49 12 A It's the median value of the seven specific
17:01:53 13 entries. So there are three values below .22, and there
17:01:58 14 are three values above .22. That makes .22 the median
17:02:04 15 value.
17:02:04 16 Q Okay. And how did you calculate the mean?
17:02:06 17 A Summed those seven values and divided by
17:02:09 18 seven.
17:02:09 19 Q Why did you choose the median rather than the
17:02:12 20 mean?
17:02:12 21 A As what I consider my best estimate?
17:02:15 22 Q Yes.
17:02:16 23 And by the way, that one appears to be in a
17:02:18 24 black box that's got an outline around it, right?
17:02:21 25 A Right.
17:02:22 26 Q And it's in heavier bold.
17:02:24 27 A Bold-face type.
17:02:26 28 Q Okay.

17:02:27 1 A And that was the number that I then went on
17:02:29 2 to use in Tables 1D and 1E.
17:02:33 3 I selected it rather than the mean value
17:02:36 4 because mean values in variable -- in variably distributed
17:02:43 5 parameters are more susceptible to outliers. Median
17:02:47 6 results are more robust. So the median number here, for
17:02:50 7 example, doesn't depend specifically on the detailed
17:02:53 8 accuracy with which, for example, the Miller et al.,
17:03:01 9 result from 1998, the high one. That number could be .8
17:03:04 10 or .5, and the same median would occur. So the median is
17:03:09 11 less susceptible to variability in the specific parameter
17:03:14 12 values than the mean is.
17:03:16 13 MR. McGUIRE: Is that always the case?
17:03:20 14 THE WITNESS: "Always" is too --
17:03:24 15 MR. McGUIRE: Okay.
17:03:25 16 THE WITNESS: -- broad for me --
17:03:27 17 MR. McGUIRE: I'll take a "no."
17:03:28 18 THE WITNESS: -- at this late stage of the
17:03:30 19 day to get my brain around.
17:03:33 20 MR. McGUIRE: Okay.
17:03:34 21 BY MR. CAFFERTY:
17:03:34 22 Q All right. In calculating the back of the
17:03:41 23 envelope, you assumed a lognormal distribution, correct?
17:03:46 24 A Correct.
17:03:46 25 Q And that's a lognormal distribution of what?
17:03:49 26 A The 'X' over 'E' parameter. This exposure in
17:04:00 27 units of cigs ETS per day.
17:04:01 28 Q What basis do you have for your conclusion

17:04:05 1 that the 'X' over 'E' is lognormally distributed?
17:04:11 2 A Well, for the back-of-the-envelope
17:04:13 3 calculation, that follows from a theorem that we discussed
17:04:25 4 briefly or we talked around earlier in the day. When a
17:04:28 5 derived result is obtained by multiplying or dividing
17:04:32 6 lognormally distributed parameters that are independent
17:04:35 7 from one another, the resulting distribution is also
17:04:38 8 lognormal.
17:04:39 9 Q So it's based on the conclusion that 'A,'
17:04:43 10 'V,' and 'N' variables are lognormally distributed?
17:04:47 11 A Correct. Or approximately so.
17:04:49 12 Q Okay. And what -- what is the basis for your

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17:04:53 13 conclusion that 'V' is lognormally distributed?
17:04:56 14 A I have collected data in some of my past
17:05:01 15 studies on the distribution of house volume for use in
17:05:04 16 indoor air modeling, and those data support -- support
17:05:10 17 this conclusion. That is, the distribution conforms
17:05:14 18 nicely to lognormality.
17:05:15 19 Q What data are you referring to?
17:05:18 20 A Their survey data. I can't recall the
17:05:23 21 specific citation at the moment.
17:05:24 22 Q Is it published in a single report, or do you
17:05:27 23 have to look at multiple reports?
17:05:29 24 A The -- for the current work, I relied upon
17:05:37 25 our reporting in Miller et al., 1998b, where the
17:05:46 26 parameters of the distribution are presented. But that's
17:05:50 27 a derived result. And so I would have to go back to that
17:05:54 28 report and then look at what it cites to get back to the

17:05:58 1 original.
17:05:59 2 VIDEOGRAPHER: Excuse me, Counsel. I need to
17:06:00 3 do a tape change in about three minutes.
17:06:02 4 MR. CAFFERTY: We're done for today.
17:06:04 5 BY MR. CAFFERTY:
17:06:04 6 Q What basis do you have for concluding that
17:06:07 7 'N,' the number of cigarettes, is lognormally distributed?
17:06:13 8 A We analyzed the data -- the survey data from
17:06:21 9 the California activity pattern study that was conducted
17:06:26 10 under the support of the Air Resources Board, in the late
17:06:32 11 1980s, early 1990s. And it was those data that led to
17:06:39 12 these results. I do not recall at the moment how well the
17:06:44 13 results conformed to lognormality.
17:06:49 14 MR. CAFFERTY: Why don't we stop for today so
17:06:52 15 we don't run out of your tape.
17:06:55 16 VIDEOGRAPHER: This concludes the deposition
17:06:57 17 for today, and we are off the record at 5:06.
17:07:00 18 (Whereupon, at 5:06 p.m. the proceedings
17:07:02 19 were adjourned.)
17:07:02 20 * * * * *
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17:07:02 1 I hereby declare under penalty of perjury that
17:07:02 2 the foregoing is my deposition under oath; that these are
17:07:02 3 the questions asked of me and my answers thereto; that I
17:07:02 4 have read my deposition and have made the necessary
17:07:02 5 corrections, additions or changes to my answers that I
17:07:02 6 deem necessary.
17:07:02 7 In witness thereof, I hereby subscribe my name,
17:07:02 8 this _____ day of _____ 2000.
17:07:02 9
17:07:02 10
17:07:02
17:07:02 11
17:07:02
17:07:02 12 _____
17:07:02 William Nazaroff, Ph.D.
17:07:02 13
17:07:02

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I, Margaret A. Smith, CSR No. 9733, hereby certify that I reported in shorthand the above proceedings on Monday, July 10, 2000, at 550 West C Street, Suite 1440, in the City of San Diego, County of San Diego, State of California; and I do further certify that the above and foregoing pages, numbered from 425 to 633, inclusive, contain a true and correct transcript of all said proceedings.

It was stipulated that the original deposition be delivered to Dr. Nazaroff, for the purpose of having the witness read, correct and sign his deposition under penalty of perjury; said original thereafter to be maintained by Mr. McGuire until the time of trial.

DATED: JULY 19, 2000.

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MARGARET A. SMITH
CSR NO. 9733

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